EXPONENTIAL PREDICTION INTERVALS

by

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1 Abstract

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This thesis examines the development of prediction intervals for the one- and two-parameter exponential distributions. Prediction intervals arise often in life test analysis as confidence intervals for observations not yet observed. The development of prediction intervals for the Poisson distribution and Erlang distribution are discussed and examples of applications are presented.

Tables for finding the appropriate percentiles of the derived distributions are presented in the appendices. These tables were computed using an IBM compatible platform with 486/33 and $486DX2-66$ microprocessors running Microsoft Q-Basic in double precision. The percentiles for given α levels were found using the method of bisection.

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2 Acknowledgments

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3 Introduction

Prediction intervals have received greater interest recently for the interpretation of sampling results, especially in the areas of life test data. The very notable contributions of Hahn and Nelson [8], Hewett [9], Lawless [14] and Nelson [19] have added greatly to our understanding of prediction intervals and their applications. However prediction intervals remain less understood than the more popular results of confidence intervals.

Prediction intervals are confidence intervals for statistics of future observations, either from within the same sample or from a future sample of an identical population, and are of the form (L, U). When L and U are both finite we say the interval is two-sided, whereas if L is equal to $-\infty$ or U is equal to $+\infty$ we say the interval is one-sided.

Suppose that $\underline{X}$ is a random vector of observations from the random variable X and $\underline{Y}$ is a vector of future observations from the random variable Y, where X and Y are identically distributed with a common, unknown parameter vector $\underline{\theta}$. To construct a $100(1-\alpha)\%$ two-sided prediction interval for a statistic $h(\underline{Y})$ we must find functions of the observed sample, $L(\underline{X})$ and $U(\underline{X})$, such that $h(\underline{Y})$ will be contained in the interval $[L(\underline{X}), U(\underline{X})]$ with probability $1-\alpha$ for all possible values of $\underline{\theta}$. The realizations of $L(\underline{X})$ and $U(\underline{X})$, L and U respectively, give the lower and upper bounds of the prediction interval. Descriptions for one-sided intervals follow a similar argument.

In this thesis we shall present a review of some of the leading literature on the development of prediction intervals for the one- and two-parameter exponential distributions, as well as a brief review of some prediction intervals for the Poisson and Erlang distributions. Section 4 will commence with a discussion of the distributions of interest followed by a discussion of a general strategy useful in developing prediction intervals. In Section 5 we will present a review of the literature involving the development of prediction intervals, and in Section 6 we will present some practical applications of the theory using the tables. We shall conclude with a general discussion of the tables required to apply the theories of prediction intervals and present direction for further study.

For clarity, the statements of relevant theorems and definitions have been left to the Appendices.

For a summary of prediction intervals covering a large number of useful distributions the reader is referred to Patel's paper, *Prediction Intervals - A Review* [23].

4 Preliminaries

Before commencing with the task of reviewing the literature dealing with the construction of prediction intervals, we will present a brief discussion of our distributions of interest and state a few definitions which are key to the understanding of this thesis. This will set the stage for our analysis and serve to clarify the discussions to follow. We will also discuss our purpose for constructing prediction intervals and present several important cases to be considered.

4.1 Distributions of Interest

This thesis will concentrate on prediction intervals for the one- and two-parameter exponential distributions and will include some discussion of the Erlang and Poisson distributions. The distributions of interest contain both discrete and continuous distributions possessing properties of considerable value in the field of life test analysis and other fields. These properties include time insensitivity and well-known mathematical behaviour, which will permit us to develop prediction intervals without resorting to assumptions which can restrict their usefulness. Each of the distributions has a probability density (or mass) function, $f(x;\underline{\theta})$ (or $p(x;\underline{\theta})$ in the discrete case), and a cumulative distribution function, $F(x;\underline{\theta})$ (or $P(x;\underline{\theta})$), which we show as follows:

ERLANG (GAMMA) DISTRIBUTION

$$f(x;\lambda,r) = \frac{\lambda(\lambda x)^{r-1}e^{-\lambda x}}{(r-1)!} \quad x>0,\ \lambda>0,\ r \text{ a positive integer} \tag{1}$$
$$= 0 \quad \textit{otherwise}$$

$$F(x;\lambda,r) = 1-\sum_{k=0}^{r-1}\frac{(\lambda x)^k e^{-\lambda x}}{k!} \quad x>0,\ \lambda>0,\ r \text{ a positive integer} \tag{2}$$
$$= 0 \quad \textit{otherwise}$$

POISSON DISTRIBUTION

$$p(x;\lambda,t) = \frac{(\lambda t)^x e^{-\lambda t}}{x!} \quad x=0,1,2,\ldots,\ \lambda>0,\ t>0 \tag{3}$$
$$= 0 \quad \textit{elsewhere}$$

$$P(x;\lambda,t) = \sum_{i=0}^{x}\frac{(\lambda t)^i e^{-\lambda t}}{i!} \quad x=0,1,2,\ldots,\ \lambda>0,\ t>0 \tag{4}$$

EXPONENTIAL DISTRIBUTION

Two-Parameter

$$f(x;\lambda,\theta) = \lambda e^{-\lambda(x-\theta)} \quad x>\theta,\ \lambda>0,\ \theta\in\Re \tag{5}$$
$$= 0 \quad \textit{elsewhere}$$

$$F(x;\lambda,\theta) = 1-e^{-\lambda(x-\theta)} \quad x>\theta,\ \lambda>0,\ \theta\in\Re \tag{6}$$
$$= 0 \quad \textit{elsewhere}$$

One-Parameter

$$f(x;\lambda) = \lambda e^{-\lambda x} \quad x > 0,\ \lambda > 0 \qquad (7)$$
$$= 0 \quad \textit{elsewhere}$$

$$F(x;\lambda) = 1 - e^{-\lambda x} \quad x > 0,\ \lambda > 0 \qquad (8)$$
$$= 0 \quad \textit{elsewhere}$$

4.2 Means and Variances

The mean, μ, and variance, σ^2, for the distributions we will be considering are given in the following table.

Distribution	Mean	Variance
One-parameter Exponential	$1/\lambda$	$1/\lambda^2$
Two-parameter Exponential	$1/\lambda + \theta$	$1/\lambda^2$
Poisson	λ	λ
Erlang (Gamma)	r/λ	r/λ^2

In practical applications we would usually have no prior knowledge of the parameter λ and hence we would not know either the mean or variance.

In the case of the exponential distribution, an unbiased estimate of the mean will enable us to develop prediction intervals. One minimum variance unbiased estimator for the mean of the exponential distribution is given by the ratio of the accumulated lifetime to the number of observations, corrected for the location parameter in the case of the two-parameter exponential distribution. The accumulated lifetime at the time of the k^{th} failure is equal to the sum of the individual lifetimes for each item in the test at the time at which the k^{th} item has failed. Denoting this quantity as T_k, we can define T_k algebraically as,

$$T_k = \sum_{i=1}^{k} X_i + (n-k)X_k \qquad (9)$$

where X_i = lifetime of the i^{th} item.

The quantity T_k/k is an unbiased estimator for the mean of the distribution and will provide a valuable statistic in the development of prediction intervals.

4.3 Order Statistics

Before we proceed, we will first examine a few general results on order statistics. Suppose we consider a random sample of size n drawn from a continuous population with cumulative distribution function $F(x;\underline{\theta})$ and density function $f(x;\underline{\theta})$. We observe the n outcomes, $X_1^*, X_2^*, \ldots, X_n^*$ and order them from smallest to largest. Denote this ordering as $X_1, X_2, \ldots, X_n$ where X_r is the r^{th} smallest outcome, or the r^{th} order statistic. Then,

1) For $r < n$, the distribution of the r^{th} order statistic is given by Theorem 10 as,

$$\frac{F(x_r)^{r-1}[1-F(x_r)]^{n-r}}{\beta(r,n-r+1)}dF(x_r) \tag{10}$$

where

$$\beta(r,s) = \frac{\Gamma(r)\Gamma(s)}{\Gamma(r+s)}$$

2) The joint sampling distribution of the k^{th} and r^{th} order statistics is given for $k < r$ by Theorem 11 as,

$$\frac{F(x_k)^{k-1}[F(x_r)-F(x_k)]^{r-k-1}[1-F(x_r)]^{n-r}}{\beta(r,n-r+1)\beta(k,r-k)}dF(x_r)dF(x_k), \quad x_k < x_r \tag{11}$$

4.4 Strategy

Consider the situation where we have n items placed on test simultaneously, and the time to failure for each item is identically distributed, with cumulative distribution function $F(x;\underline{\theta})$ and density function $f(x;\underline{\theta})$. Let $X_i, \quad i = 1, 2, \ldots, k$ be the ordered times of the first k failed items. We wish to construct a prediction interval for future observations.

Immediately we are presented with several cases.

C1 (Within sample prediction) Suppose we wish to construct a prediction interval for the time of the r^{th} failure, X_r, based on $X_1, X_2, \ldots, X_k$, where $k < r \leq n$.

C1.1 Predicting the time of the last failure ($r = n$).

C1.2 Predicting the time of the next failure ($k = r - 1$).

C1.3 Predicting the time of the r^{th} failure when failed units are immediately replaced.

C2 (Future sample prediction) Suppose we observe a sample of size n until r items have failed. Given a sample of size m from the same population, we wish to construct prediction intervals for failure times from this second sample. This gives rise to several options:

C2.1 Predicting the average (or total) failure time of a future sample.

C2.2 Predicting the s^{th} order statistic of a future sample.

C2.3 Predicting the time of system failure for an m-series system with stand-by components.

The development of prediction intervals follows a two part strategy. First, it is necessary to define a probability statement combining the information already collected with the quantity for which we wish to obtain a prediction interval. Then, after determining the distributions of the statistics used in this statement, we can solve the probability statement to determine a prediction interval.

5 Literature Review

We begin with the one- and two-parameter exponential distributions as these possess properties which are well documented and simple to work with. This will be followed by a brief examination of the Poisson and Erlang distributions.

5.1 One-Parameter Exponential

Lawless [14] and [15] has developed prediction intervals for the one-parameter exponential distribution which we shall present here.

5.1.1 Within the Same Sample

We will begin by considering Case $C1$, which was discussed earlier. By Theorem 7, we see that T_k/k is a minimum variance, unbiased estimator for the mean of the exponential distribution, and Theorem 8 shows that the statistic $2\lambda T_k$ has a *chi-squared* distribution with $2k$ degrees of freedom.

Now, consider the time between the k^{th} and r^{th} ordered times to failure given by,

$$X_r - X_k \qquad k < r \leq n$$

Theorem 9 shows the random variables $\lambda(X_r - X_k)$ and λT_k are mutually independent with distributions that do not depend on λ. Consequently, the distribution of

$$U_{r,k} = \frac{(X_r - X_k)}{T_k} \tag{12}$$

will not depend on the parameter λ, and thus does not require prior knowledge of λ to enable us to develop a prediction interval for X_r. The joint density function of (X_k, X_r) is given by eqn. (11), where $F(x) = 1 - e^{-\lambda x}$. If we make the transformation $Z = X_r - X_k$ and $X_k = X_k$ we can integrate out X_k to obtain the density function of Z, namely

$$f(z;\lambda) = \frac{\lambda(n-k)!(e^{-\lambda z})^{n-r+1}[1-e^{-\lambda z}]^{r-k-1}}{(r-k-1)!(n-r)!}, \quad z > 0 \tag{13}$$

Because T_k can be expressed as the sum of k independent, identically distributed exponential variables (see Epstein and Sobel [5]), its density is given by

$$f(t_k;\lambda) = \frac{\lambda^k (t_k)^{k-1} e^{-\lambda t_k}}{(k-1)!}, \quad t_k > 0 \ . \tag{14}$$

Since T_k and $Z = X_r - X_k$ are independent their joint density function is the product of the two marginal density functions given in eqn. (13) and eqn. (14), namely,

$$f(z,t_k;\lambda) = \frac{(n-k)!\lambda^{k+1} t_k^{k-1} e^{-\lambda t_k}(e^{-\lambda z})^{n-r+1}[1-e^{-\lambda z}]^{r-k-1}}{(r-k-1)!(n-r)!(k-1)!} \tag{15}$$
$$z > 0,\ t_k > 0$$

Next, we make the transformation $U = Z/T_k$ and $T_k = T_k$ to find the joint density of U and T_k. Integrating out T_k we obtain the results of Theorem 14, which gives the density function of U to be,

$$f(u) = k \sum_{i=0}^{r-k-1} \frac{(n-k)! \binom{r-k-1}{i} (-1)^i [1+u\phi_i]^{-(k+1)}}{(r-k-1)!(n-r)!}, \quad u > 0 \qquad (16)$$

where

$$\phi_i = n-r+i+1 \ .$$

Knowing the distribution of U allows us to make prediction statements about X_r on the basis of observed X_k and T_k. By using the density function for U we can obtain probability statements about U as follows.

The probability that the random variable U will equal or exceed a specified positive value, say t, is given by,

$$\begin{aligned} Pr[U \geq t] &= k \sum_{i=0}^{r-k-1} \frac{\binom{r-k-1}{i}(-1)^i}{\varphi} \int_t^\infty [1+u\phi_i]^{-(k+1)}\, du \qquad (17) \\ &= \sum_{i=0}^{r-k-1} \frac{\binom{r-k-1}{i}(-1)^i [1+t\phi_i]^{-k}}{\varphi\phi_i} \\ &= P(t;n,r,k) \end{aligned}$$

where

$$\begin{aligned} \phi_i &= n-r+i+1 \\ \varphi &= \frac{(r-k-1)!(n-r)!}{(n-k)!} \ . \end{aligned}$$

Hence the cumulative distribution of U, $F_U(t)$, is $1 - P(t;n,r,k)$. Recalling that $U = (X_r - X_k)/T_k$, then $Pr[U \leq t_\alpha] = 1-\alpha$ yields a one-sided $100(1-\alpha)\%$ prediction interval for X_r based on the observations $x_1, \ldots, x_k$, namely

$$Pr[X_r \leq X_k + t_\alpha T_k] = 1-\alpha \ . \qquad (18)$$

Thus, after observing the times of the first k failures it is possible to construct a prediction interval for X_r, the time to failure for the r^{th} failure, where $k < r \leq n$. Using eqn. (17) to determine the value of t_α which satisfies our choice of α we use eqn. (18) to obtain the result.

Also, $(X_k + t_{1-\alpha/2}T_k, X_k + t_{\alpha/2}T_k)$ is a $100(1-\alpha)\%$ prediction interval for X_r.

Next we shall consider Cases $C1.1, C1.2$ and $C1.3$.

($C1.1$) Predicting the time of the last failure ($n = r$).

From eqn. (17) we let $r = n$ to obtain,

$$\begin{aligned} P(t; n, n, k) &= (n-k)\sum_{i=0}^{n-k-1}\binom{n-k-1}{i}(-1)^i\frac{[1+t(i+1)]^{-k}}{i+1} \\ &= 1-\sum_{i=0}^{n-k}\binom{n-k}{i}(-1)^i[1+it]^{-k} \end{aligned}$$

which simplifies to,

$$Pr[U \leq t] = \sum_{i=0}^{n-k}\binom{n-k}{i}(-1)^i[1+it]^{-k} \tag{19}$$

This computational formula will allow a simpler construction of the appropriate prediction interval.

($C1.2$) Predicting the time of the next failure ($k = r-1$).

First define Y as,

$$\begin{aligned} Y &= (r-1)(n-r+1)\frac{X_r - X_{r-1}}{T_{r-1}} \\ &= \frac{2(n-r+1)\lambda(X_r - X_{r-1})}{2} \Big/ \frac{2\lambda T_{r-1}}{2r-2} \end{aligned}$$

We know that $2(n-r+1)\lambda(X_r - X_{r-1})$ has a *chi-squared* distribution with 2 degrees of freedom and $2\lambda T_{r-1}$ has a *chi-squared* distribution with $2r-2$ degrees of

freedom. Hence, by the independence of the numerator and denominator, Y has an F distribution with 2 and $(2r-2)$ degrees of freedom. We can produce a $100(1-\alpha)\%$ one-sided prediction interval for the time to the r^{th} failure knowing the times of the first $r-1$ failures using,

$$X_r \leq X_{r-1} + T_{r-1}\frac{F_{\alpha;2,2r-2}}{(r-1)(n-r+1)} \tag{20}$$

and $(X_{r-1}, X_{r-1} + \frac{T_{r-1}F_{\alpha;2,2r-2}}{(r-1)(n-r+1)})$ is a $100(1-\alpha)\%$ prediction interval for X_r.

($C1.3$) Predicting the time of the r^{th} failure when failed units are immediately replaced.

In this situation we have n systems running simultaneously with defective systems being replaced. The systems are run until a predetermined number of failures have occurred.

Denote X_k to be the time to the k^{th} system failure. In general we know that $2n\lambda X_k$ has a *chi-squared* distribution with $2k$ degrees of freedom. Thus $2n\lambda(X_r - X_k) = 2n\lambda X_r - 2n\lambda X_k$ will have a *chi-squared* distribution with $(2r-2k)$ degrees of freedom.

Using the memoryless property we know $2\lambda(X_r - X_k)$ and $2\lambda X_k$ are independent. Therefore, by taking the ratio of these two quantities, each divided by its respective degrees of freedom, we obtain an F variate from which we can obtain the one-sided $100(1-\alpha)\%$ prediction interval for X_r, namely

$$X_r \leq X_k(1 + (r-k)\frac{F_{\alpha;2r-2k,2k}}{k}) \tag{21}$$

and $(X_k(1 + \frac{r-k}{kF_{\alpha/2;2k,2r-2k}}), X_k(1 + \frac{(r-k)F_{\alpha/2;2r-2k,2k}}{k}))$ is a two-sided $100(1-\alpha)\%$ prediction interval for X_r.

5.1.2 Future Samples

After observing the times to failure for the first k items, denoted $x_1, x_2, \ldots, x_k$, we wish to construct a joint prediction interval for the times to failure for a second sample of m items drawn from the same population. [This corresponds to case $C2$.] We further note that the special case of $k = n$ corresponds to prediction without censoring and will not be dealt with specifically in this text.

First, let $Y_1, Y_2, \ldots, Y_m$ represent the ordered times to failure for a second sample to be drawn from the same population with corresponding ordered observations $y_1, y_2, \ldots, y_m$, and let $Y_j^*, \quad j = 1, 2, \ldots, m$, be the unordered times to failure.

Let $P_j = 2\lambda Y_j^* \quad j = 1, 2, \ldots, m$. Each P_j has a *chi-squared* distribution with 2 degrees of freedom. If we define

$$\begin{aligned} 2\lambda S_m &= \sum_{i=1}^{m} 2\lambda Y_i^* \\ &= \sum_{i=1}^{m} 2\lambda Y_i \end{aligned}$$

it follows that $2\lambda S_m$ has a *chi-squared* distribution with $2m$ degrees of freedom.

($C2.1$) Predicting the average (or total) of a future sample.

We have shown that $2\lambda S_m$ has a *chi-squared* distribution with $2m$ degrees of freedom, and we know $2\lambda T_k$ has a *chi-squared* distribution with $2k$ degrees of freedom. Moreover, $2\lambda S_m$ and $2\lambda T_k$ are independent of each other, thus $(2\lambda S_m/2m)/(2\lambda T_k/2k) = \frac{\bar{Y}}{T_k/k}$ has an F distribution with $(2m, 2k)$ degrees of freedom. This allows us to make probability statements about $\frac{\bar{Y}}{T_k/k}$ and to derive prediction intervals for the mean of future samples. The statement,

$$Pr[\frac{\bar{Y}}{T_k/k} \geq F_{1-\alpha;2m,2k}] \quad = \quad 1 - \alpha \tag{22}$$

yields a $100(1-\alpha)\%$ one-sided prediction interval,

$$\bar{Y} \quad \geq \quad F_{1-\alpha;2m,2k}\frac{T_k}{k} \tag{23}$$

and $(\frac{T_k}{kF_{\alpha/2;2k,2m}}, \frac{T_k F_{\alpha/2;2m,2k}}{k})$ is a two-sided $100(1-\alpha)\%$ prediction interval for $\bar{Y}$.

This prediction interval allows us to predict the average of a future sample based on the observed accumulated lifetime until the k^{th} failure from a preliminary sample.

($C2.2$) Predicting the s^{th} order statistic of a future sample.

First we note that $Z_i = (2\lambda Y_i^*/2)/(2\lambda T_k/2k)$ form m correlated F variates. The joint density of $Z_1, Z_2, \ldots, Z_m$ is given in Lawless [15] by,

$$f(z_1, \ldots, z_m) = (k+m-1)!k^{-m}\frac{(1+\sum_{i=1}^m z_i/k)^{-(k+m)}}{(k-1)!}, \quad z_i's > 0 \tag{24}$$

By deriving joint probability statements about $Z_1, Z_2, \ldots, Z_m$ we can construct joint prediction statements for the observations Y_i^*, $i = 1, 2, \ldots, m$, based on the realization of T_k/k from the first sample.

First, consider $1 \leq r \leq m-1$, and denote

$$\zeta(t; k, m, r) = Pr[exactly\ r\ of\ Z_1, Z_2, \ldots, Z_m\ exceed\ t]$$

Using the density from eqn. (24) we obtain,

$$\zeta(t; k, m, r) = \binom{m}{r} \int_0^t \cdots \int_0^t \int_t^\infty \cdots \int_t^\infty f(\underline{z})\, dz_1, \ldots, dz_r, dz_{r+1}, \ldots, dz_m$$

After integration this simplifies to,

$$\zeta(t; k, m, r) = \binom{m}{r} \sum_{i=0}^{m-r} \binom{m-r}{i} (-1)^i [1 + (r+i)\frac{t}{k}]^{-k} \tag{25}$$

Eqn. (25) also holds for $r = 0$ and $r = m$. If we denote

$$\begin{aligned} \kappa(t; k, m, r) &= Pr[at\ least\ r\ of\ Z_1, Z_2, \ldots, Z_m\ exceed\ t] \\ &= Pr[at\ least\ r\ of\ Y_1^*, Y_2^*, \ldots, Y_m^*\ exceed\ t\frac{T_k}{k}] \\ &= Pr[Y_{m-r+1} \geq t\frac{T_k}{k}] \end{aligned}$$

it follows that,

$$\kappa(t; k, m, r) = \sum_{j=r}^m \zeta(t; k, m, j) \qquad 0 \leq r \leq m\ . \tag{26}$$

Let c_α be the $100(1-\alpha)^{th}$ percentile of the distribution of $\frac{Y_s}{T_k/k}$. Then $\alpha = Pr[\frac{Y_s}{T_k/k} \geq c_\alpha] = \kappa(c_\alpha; k, m, m-s+1)$, so $c_{1-\alpha}\frac{T_k}{k}$ is a $100(1-\alpha)\%$ lower prediction bound for Y_s and

$$(c_{1-\alpha/2}\frac{T_k}{k} \quad , \quad c_{\alpha/2}\frac{T_k}{k}) \tag{27}$$

is a $100(1-\alpha)\%$ prediction interval for Y_s, the s_{th} order statistic from the second sample.

In the special case $s = 1$, $\frac{mY_1}{T_k/k}$ has an F distribution with $(2, 2k)$ degrees of freedom, so $\frac{T}{mkF_{\alpha;2k,2}}$ is a one-sided $100(1-\alpha)\%$ lower prediction bound for Y_1 and

$$(\frac{T_k}{mkF_{\alpha/2;2k,2}} \quad , \quad \frac{T_k F_{\alpha/2;2,2k}}{mk}) \tag{28}$$

is a $100(1-\alpha)\%$ prediction interval for Y_1.

5.1.3 Additional Notes on the Prediction Result

The results of prediction intervals for future samples from the exponential distribution can provide us with the means of investigating more complex systems of identical components. Consider a system which consists of m identical operating units, along with $p-1$ identical stand-by units, each exhibiting an exponential life. When an operating unit fails it is immediately replaced by a stand-by unit. The system remains operational as long as m units are functioning. Thus the system will fail when p of the units have failed. We call such a system a Series System with Stand-by Components.

If Y_p is the time to the p^{th} failure, then we know that $2m\lambda Y_p$ has a *chi-squared* distribution with $2p$ degrees of freedom. If we observe T_k/k then $mY_p/(pT_k/k)$ has an F distribution with $(2p, 2k)$ degrees of freedom. We can now construct a $100(1-\alpha)\%$ lower prediction limit for Y_p using $\frac{pT_k}{mkF_{\alpha;2k,2p}}$, and $(\frac{pT_k}{mkF_{\alpha/2;2k,2p}}, \frac{pT_kF_{\alpha/2;2p,2k}}{mk})$ is a $100(1-\alpha)\%$ prediction interval for Y_p.

If $m = 1$, the system will fail when all p of the units have failed. We call such a system a Stand-by Redundant System.

5.2 Two Parameter Exponential

Sometimes in life testing, a one-parameter exponential is inadequate for representing the observed results. To improve on the process we introduce a second non-negative parameter θ, the location parameter, to obtain the two-parameter exponential distribution. This distribution has the density function, $f(x;\lambda,\theta)$, given by eqn. (5) and cumulative distribution, $F(x;\lambda,\theta)$, given by eqn. (6). Several authors, including Likes [17], Ng [21] and Lawless [16] have developed prediction intervals for the two-parameter exponential distribution.

As before, we define $X_1, X_2, \ldots, X_n$ to be the ordered lifetimes. It is well-known (see Epstein and Sobel [5]) that the joint distribution of $(X_2 - X_1, X_3 - X_1, \ldots, X_n - X_1)$ is that of n-1 ordered lifetimes in a random sample from a one-parameter exponential distribution. Therefore, we can obtain results corresponding to cases $C1, C1.1$ and $C1.2$ discussed in Section 5.1.1 directly upon restricting attention to the $n-1$ ordered lifetimes after the first failure, replacing n by $n-1$, k by $k-1$, and T_k by $T_{(k)}$ defined as follows:

$$\begin{aligned} T_{(k)} &= \sum_{i=2}^{k}(X_i - X_1) + ((n-1)-(k-1))(X_k - X_1) \qquad k \leq n \qquad (29) \\ &= \sum_{i=1}^{k}(X_i - X_1) + (n-k)(X_k - X_1) \end{aligned}$$

Note that $T_{(k)} = T_k - nX_1$ is the total lifetime accumulated between the first and k^{th} failed units.

5.2.1 Within the Same Sample

For $1 < k < r \leq n$, a $100(1-\alpha)\%$ prediction interval for X_r is given by $(X_k + t_{1-\alpha/2;n-1,r-1,k-1}T_{(k)}, X_k + t_{\alpha/2;n-1,r-1,k-1}T_{(k)})$, and $X_k + t_{\alpha;n-1,r-1,k-1}T_{(k)}$ is a $100(1-\alpha)\%$ upper prediction bound for X_r, where $t_{\delta;n-1,r-1,k-1}$ satisfies

$$\begin{aligned} \delta &= Pr[\frac{X_r - X_k}{T_{(k)}} \leq t_{\delta;n-1,r-1,k-1}; n-1, r-1, k-1] \\ &= 1 - P(t_{\delta;n-1,r-1,k-1}; n-1, r-1, k-1) \\ &= \sum_{i=0}^{r-k-1} \binom{r-k-1}{i} \frac{(-1)^i[1+(n-r+i+1)t_\delta]^{1-k}(n-k)!}{(r-k-1)!(n-r)!(n-r+i+1)} \end{aligned}$$

If $k = r-1$, the F distribution can be used to obtain a $100(1-\alpha)\%$ prediction interval for X_r having the form

$$(X_{r-1} \quad , \quad X_{r-1} + \frac{T_{(r-1)}F_{\alpha;2,2r-4}}{(r-2)(n-r+1)}) \ . \tag{30}$$

5.2.2 Future Samples

Again, we let $Y_1, Y_2, \ldots, Y_m$ denote the ordered lifetimes for a second random sample to be drawn independently from the same two-parameter exponential population. Since the joint distribution of $(Y_2 - Y_1, Y_3 - Y_1, \ldots, Y_m - Y_1)$ is that of m-1 ordered lifetimes in a random sample from a one-parameter exponential distribution, we know that $2\lambda(\sum_{i=1}^{m} Y_i - mY_1)$ and $2\lambda T_{(r)}$ are independent *chi-squared* variables with degrees of freedom $2(m-1)$ and $2(r-1)$ respectively. Therefore, $\frac{2\lambda(m\bar{Y}-mY_1)/2(m-1)}{2\lambda T_{(r)}/2(r-1)} = \frac{(r-1)m}{m-1}\frac{(\bar{Y}-Y_1)}{T_{(r)}}$ possesses an F distribution with $(2m-2, 2r-2)$. Hence,

$$(\frac{(m-1)T_{(r)}}{(r-1)mF_{\alpha/2;2r-2,2m-2}} \quad , \quad \frac{(m-1)T_{(r)}F_{\alpha/2;2m-2,2r-2}}{(r-1)m}) \tag{31}$$

is a $100(1-\alpha)\%$ prediction interval for $\bar{Y} - Y_1$.

The next two prediction intervals, for Y_s and $\bar{Y}$, probably have more user interest than $\bar{Y} - Y_1$.

Letting $Z = n(Y_s - X_1)/T_{(r)}$ and $P(z; s, m, r, n) = Pr[Z \geq z]$, it is well-known (see Lawless [16]) that

$$\begin{aligned} P(z;s,m,r,n) &= n\sum_{k=0}^{s-1} \frac{(-1)^k m!(1+\frac{z\phi_k}{n})^{1-r}}{k!(s-k-1)!(m-s)!\phi_k(\phi_k+n)} \ , \quad z>0 \qquad (32) \\ &= 1 - \frac{m!(m+n-s)!}{(m+n)!(m-s)!(1-z)^{r-1}} \ , \qquad z \leq 0 \end{aligned}$$

where

$$\phi_k = m-s+k+1 \ .$$

To construct a two-sided prediction interval for Y_s, the s^{th} time to failure from a future sample of size m we determine the values $z_{1-\alpha}$ and $z_{1-\beta}$ for our chosen α and β levels of significance ($\alpha < \beta$) using,

$$P(z_\delta; s, m, r, n) = \delta \ , \tag{33}$$

$$\tag{34}$$

where s, m, r and n are given. The resulting two-sided $100(\beta - \alpha)\%$ prediction interval for Y_s is given by,

$$(X_1 + z_{1-\alpha}\frac{T_{(r)}}{n} \quad , \quad X_1 + z_{1-\beta}\frac{T_{(r)}}{n}) \tag{35}$$

and the one-sided $100(1-\alpha)\%$ prediction interval for Y_s is given by,

$$Y_s \geq X_1 + z_{1-\alpha}\frac{T_{(r)}}{n} \tag{36}$$

Now we wish to develop a prediction interval for the mean or total lifetime of a second sample of size m. Once again we have the total lifetime accumulated between the first and r^{th} failed units, $r \leq n$, from the first sample given by $T_{(r)}$. We note that in the case where $r = n$ we are dealing with an uncensored first sample. To begin we define,

$$U = n(\bar{Y} - X_1)/T_{(r)} \tag{37}$$

Lawless [16] derived the distribution of U as,

$$\begin{aligned} Pr[U \geq u] &= \sum_{j=0}^{m-1} \binom{r+j-2}{j} \frac{(mu/n)^j[1-(1+\frac{n}{m})^{j-m}]}{(1+mu/n)^{r+j-1}}, \quad u > 0 \\ &= 1-(1+\frac{n}{m})^{-m}(1-u)^{1-r}, \qquad u \leq 0 \ . \end{aligned} \tag{38}$$

Knowing the distribution of U will allow us to construct a $100(1-\alpha)\%$ prediction interval for $\bar{Y}$ or equivalently $\sum_{i=1}^{m} Y_i$. First we determine $u_{1-\alpha}$ from eqn. (38) as

$$Pr[U \geq u_{1-\alpha}] = 1 - \alpha$$

for our choice of α, then observing $T_{(r)}$ for given n and m we solve eqn. (37) for $\bar{Y}$ to obtain the one-sided $100(1-\alpha)\%$ prediction interval,

$$\begin{aligned} \bar{Y} &\geq T_{(r)}\frac{u_{1-\alpha}}{n} + X_1 \\ &\text{or} \\ \sum_{i=1}^{m} Y_i &\geq T_{(r)}\frac{u_{1-\alpha}m}{n} + mX_1 \ . \end{aligned} \tag{39}$$

Also, $(X_1 + u_{1-\alpha/2}\frac{T_{(r)}}{n}, X_1 + u_{\alpha/2}\frac{T_{(r)}}{n})$ is a $100(1-\alpha)\%$ prediction interval for $\bar{Y}$.

5.3 Poisson Distribution

The Poisson Distribution has a variety of useful applications for prediction intervals. Widely used for breakdown analysis, operations research and in the management sciences, the Poisson distribution differs from the exponential distribution by being discrete instead of continuous.

Faulkenberry [6] provides a general method for developing prediction intervals and gives the Poisson distribution as an example. Hahn and Nelson [8], Nelson [19] and Shah [25] also have provided developments of Poisson prediction intervals. Due to the discrete nature of the Poisson distribution we must modify the development of prediction intervals from that which we have seen thus far.

To begin, consider the situation where we are observing a Poisson process with failures occurring at random times at a rate equal to λ. Denote the number of failures occurring in an interval of length t as X and the number of failures occurring in a future interval of length s as Y. We know that for any given Poisson process the number of events occurring in one time interval is independent of the number of events occurring in any other non-overlapping time interval regardless of the length of the intervals. Therefore we can think of X and Y as being independent Poisson random variables.

Faulkenberry [6] suggests the following approach to Poisson prediction intervals. The joint probability of X and Y is given by,

$$Pr[X = r\ ,\ Y = k] = \frac{(\lambda t)^r e^{-\lambda t}(\lambda s)^k e^{-\lambda s}}{r!k!}$$

and the conditional distribution of Y, given $X + Y$ is,

$$Pr[Y = k \mid X + Y = r + k\ ] = \left(\begin{array}{c} r+k \\ k \end{array} \right) p^k (1-p)^r \qquad (40)$$

where

$$p = \frac{s}{t+s}$$

This describes a binomial distribution with parameters $r + k$ and p. We wish to choose an interval $[a, b]$ such that the probability defined by eqn. (40) will be close to $1 - \alpha$, namely,

$$\sum_{i=a}^{b} \left(\begin{array}{c} r+k \\ i \end{array} \right) p^i (1-p)^{r+k-i} \doteq 1 - \alpha \qquad (41)$$

By choosing an interval with approximately equal probabilities on each side of the interval we will look for a and b such that,

$$\begin{aligned} \sum_{i=0}^{a-1} \binom{r+a}{i} p^i (1-p)^{r+a-i} &\leq \frac{\alpha}{2} \\ \sum_{i=0}^{b} \binom{r+b}{i} p^i (1-p)^{r+b-i} &\geq 1 - \frac{\alpha}{2} \end{aligned} \tag{42}$$

This yields an approximate $100(1-\alpha)\%$ prediction interval for Y and probabilities for eqn. (42) can be obtained using the incomplete Beta function.

5.4 Erlang Distribution

As we have seen in the previous sections we often encounter the Erlang distribution when working with the Poisson and exponential distributions. Work on Erlang prediction intervals have been conducted by such authors as Lawless [15] and Hewett [9]. Hewett [9] proposed the following prediction interval.

Let $X_i, \quad i = 1,\ldots,n$ be a random sample from an Erlang distribution with parameters r and λ. Suppose that we only observe the first k, $1 \leq k \leq n$, of these X's. Define U, V, and T as,

$$U = \sum_{i=1}^{k} X_i, \quad V = \sum_{i=k+1}^{n} X_i, \quad T = \sum_{i=1}^{n} X_i \tag{43}$$

If we define the random variables $Y_i, \quad i = 1,\ldots,n$ to be $Y_i = 2\lambda X_i$ then the Y_i's are mutually independent and each possesses a *chi-squared* distribution with $2r$ degrees of freedom. Then for any $\lambda > 0$ the ratio $(V/U)(k/[n-k])$ will possess an F distribution with $2r(n-k)$ and $2rk$ degrees of freedom. Thus, for given α, n and k we have the probability statement,

$$\begin{aligned} 1-\alpha \quad = \quad & Pr[(\frac{(n-k)F_{1-\alpha/2;2r(n-k),2rk}}{k} + 1)U \\ & < T < (\frac{(n-k)F_{\alpha/2;2r(n-k),2rk}}{k} + 1)U] \end{aligned} \tag{44}$$

From eqn. (44) we can derive $100(1-\alpha)\%$ prediction intervals for T,

$$((\frac{n-k}{kF_{\alpha/2;2rk,2r(n-k)}} + 1)U \quad , \quad (\frac{(n-k)F_{\alpha/2;2r(n-k),2rk}}{k} + 1)U) \tag{45}$$

and V,

$$(\frac{n-k}{kF_{\alpha/2;2rk,2r(n-k)}}U \quad , \quad \frac{(n-k)F_{\alpha/2;2r(n-k),2rk}}{k}U) \tag{46}$$

6 Applications

6.1 One-Parameter Exponential Applications

6.1.1 Breakdowns in an n-parallel Process

Consider a process which utilizes n components working in parallel, each having an exponential breakdown time. After observing the first k breakdowns we wish to construct a prediction interval for the time of a future breakdown.

Example: Suppose a process involves 20 units working in parallel with exponential lifetimes. From the start of the process the times for the first 5 breakdowns were (in hours): 8.8, 14.9, 21.1, 24.5 and 39.4. Thus $T_5 = 699.7$ hours.

a) (Corresponding to Case $C1.2$). With 95% confidence when should the next breakdown be expected?

$k = r - 1 = 5$, therefore we will use eqn. (20) and standard F tables to obtain the prediction interval.

$$\begin{aligned} F &= F_{.05;2,10} \\ &= 4.10 \end{aligned}$$

hence

$$\begin{aligned} X_6 &\leq X_5 + \frac{T_5 F}{(r-1)(n-r+1)} \\ &= 39.4 + 699.7\frac{4.10}{5 \times 15} \ \textit{hours} \\ &= 77.7 \ \textit{hours} \end{aligned}$$

Thus we can expect the next breakdown to occur within 77.7 hours from the start of the process with 95% confidence.

b) (Corresponding to Case $C1$). Suppose the process is considered ineffectual when at least 75% of the units have broken down. With 90% confidence when will the process become ineffectual?

First we note that 75% of 20 units is 15 units. Then using Table W we obtain $t_{.10;20,15,5} = 0.4578$ for $n = 20$, $r = 15$ and $k = 5$. Thus,

$$\begin{aligned} X_{15} &\leq X_5 + t_{.10;20,15,5}T_5 \\ &\leq 39.4 + 0.4578 \times 699.7 \ \textit{hours} \\ &\leq 359.7 \ \textit{hours} \end{aligned}$$

Therefore we can be 90% confident that the process will become ineffectual within 359.7 hours of the start of the process.

Also, $t_{.95;20,15,5} = .0867$ and $t_{.05;20,15,5} = .5782$ thus

$$\begin{aligned} (39.4 + t_{.95;20,15,5}699.7 \quad &, \quad 39.4 + t_{.05;20,15,5}699.7) \\ &\text{or} \\ (100.1 \quad &, \quad 444.0) \end{aligned}$$

is a 90% prediction interval for X_{15}.

c) (Corresponding to Case $C1.1$). With 95% confidence when will the process shut down completely?

Here $r = n = 20$. From Table W we find $t_{.05;20,20,5} = 1.8989$, and

$$\begin{aligned} X_{20} &\leq X_5 + t_{.05;20,20,5}T_5 \\ &\leq 39.4 + 1.8989 \times 699.7 \ \textit{hours} \\ &\leq 1368.1 \ \textit{hours} \end{aligned}$$

Thus we can be 95% confident that the entire process will cease within 1368.1 hours of the start of the process.

6.1.2 Sensitive Manufacturing Breakdowns

(Corresponding to Case $C1.3$). Consider a manufacturing process where the production from n machines is being monitored and the production of a substantially defective product occurs according to an exponential distribution. When a substantially defective product is detected the monitoring unit initiates a recalibration sequence on the affected machine and the machine continues production, similar to the machine having broken down and been replaced immediately. It is desirable to

predict when a substantially defective product will occur in the future so that the workload on the recalibration sequence of the monitoring unit can be determined.

Example: Suppose 20 machines are producing sensitive electronic components and that when a substandard component is detected the machine which produced it is recalibrated and continues production. The times from the commencement of the production run for the first 14 substandard products are (in minutes):

$23, 29, 30, 34, 39, 41, 42, 43, 47, 50, 52, 55, 60, 69.$

a) With 95% confidence when will the next substandard component be produced?

Using standard F tables and eqn. (21) we obtain,

$$\begin{aligned} F_{.05;2,28} &= 3.34 \\ \text{Thus} & \\ X_{15} &\leq 69(1+\frac{3.34}{14})\ \textit{minutes} \\ &\leq 85.5\ \textit{minutes} \end{aligned}$$

We can be 95% confident that the next substandard component will be produced within 85.5 minutes from the start of the production run.

b) With 90% confidence how long will it take for the next 15 substandard units to be produced?

Using the same procedure as in part a) we obtain,

$$\begin{aligned} F_{.1;30,28} &= 1.63 \\ \text{Thus} & \\ X_{29} &\leq 69(1+15\frac{1.63}{14})\ \textit{minutes} \\ &\leq 189.5\ \textit{minutes} \\ \text{hence} & \\ 189.5-69 &= 120.5\ \textit{minutes} \end{aligned}$$

Thus we can be 90% confident that the next 15 substandard units will be produced in the next 120.5 minutes.

Also, $F_{.05;28,30} = 1.85$ and $F_{.05;30,28} = 1.87$ thus

$$(69(1 + \frac{15(1.85)}{14}) \quad , \quad 69(1 + 15\frac{1.87}{14}))$$

or

$$(108.9 \quad , \quad 207.2)$$

is a 90% prediction interval for X_{29}.

6.1.3 Reliability in "r out of k" Systems

The notion of reliability is of extreme importance in the development of warranties, guarantees and in situations where failure of the system could result in serious consequences. Thus it is desirable to ascertain when a system is likely to fail. Consider a system which is comprised of k identical units each failing independently according to an exponential distribution, and it is known that the system will remain functional when at least r out of the k units are functioning. Two special cases are of particular note, when $r = 1$ the system is said to be operating in parallel and when $r = k$ the system is said to be operating in series.

Example: Consider a system consisting of ten identical units whose lifetimes are exponentially distributed. Complete testing of 12 units representative of those used in the system yielded an accumulated lifetime of 10,248 hours.

a) (Corresponding to Case $C2.1$). Series Systems ($r = k$). If all ten units are required to be functional for the system to operate, with 95% confidence what is the life of the system?

Since all units must be functional we wish to determine when the first failure will occur. From standard F tables we find $F_{.05;24,2} = 19.45$ and $F_{.05;2,24} = 3.40$. From eqn. (28) a 90% prediction interval for Y_1 is given by

$$(\frac{10248}{(10)(12)(19.45)} \quad , \quad 3.4\frac{10248}{(10)(12)})$$

or

$$(4.39 \quad , \quad 290.36)$$

Thus we can be 90% confident that the system will remain operational for between 4.39 hours and 290.36 hours.

b) (Corresponding to Case $C2.2$). "r out of k" Systems. If k units make up the system and r of these, $1 \leq r \leq k$, must be functional for the system to operate, we describe this as an "r out of k" system. Note that if $r = k$ we have a series system as in example a), and if $r = 1$ we have a parallel system. In our example, if the system remains operational as long as at least 4 of the units are functional, with 98% confidence what is the life of the system?

Using Table K we find $c_{.99} = 0.1474$ and $c_{.01} = 2.0663$, for $k = 12$, $m = 10$, $s = 5$ and $\alpha = .02$. A 98% prediction interval for Y_6 is given by

$$\begin{array}{c} (\ (.1474)(854) \quad , \quad (2.0663)(854) \ ) \\ \text{or} \\ (125.9 \quad , \quad 1764.6) \end{array}$$

Therefore the life of the system will fall between 125.9 and 1764.6 hours with 98% confidence.

6.1.4 Field Testing Military Hardware

(Corresponding to Case $C2.2$). Suppose a military field commander wishes to evaluate the efficacy of his armoured vehicles under simulated combat conditions. While on maneuvers he records the times to breakdown for the 15 tanks under his command. It is assumed that the times to breakdown for the tanks possess independent exponential distributions with common unknown mean and that the tanks are all uniformly serviced and functional at the beginning of the test. He records the times to breakdowns for the first five breakdowns as $16, 51, 54, 119$ and 161 hours, respectively. The test is discontinued but the commander wishes to predict when, in future field situations, it is likely that his unit will become ineffective due to non-combat breakdowns.

In future tests the commander wishes to know, with 95% confidence, the earliest time that the tenth breakdown will occur?

We will use Table K to obtain a one-sided prediction interval where,

$$\begin{aligned} k &= 5 \\ n = m &= 15 \\ s &= 10 \end{aligned}$$

$$
\begin{aligned}
\alpha &= .05 \\
\text{thus} & \\
t_5 &= 2011 \text{ hours} \\
c_{1-.05} &= 0.4336 \\
\text{and} & \\
Y_{10} &\geq c_{1-.05} t_5/5 \\
&= (.4336)(2011/5) \\
&= 174.4 \text{ hours}
\end{aligned}
$$

Therefore with 95% confidence the tenth tank breakdown will occur after 174.4 hours.

6.2 Two-Parameter Exponential Applications

6.2.1 Breakdowns after Burn-In

(Corresponding to section 5.2.1). Consider the manufacturing of computer components. It has been observed that the components have exponential breakdown times after a burn-in period, the length of which is not specifically known. In testing the components, n identical items are placed on test simultaneously and the times to failure are noted.

a) Suppose we place 30 items on test until we observe the 15^{th} failure. If the accumulated lifetime after the first failure until the 15^{th} failure is 1853 days, when can the next breakdown be expected with 95% confidence?

$$
\begin{aligned}
r &= 16 \\
k &= 15 \\
t_{(15)} &= 1853 \\
x_{15} &= 259 \\
F_{.05;2,28} &= 3.34
\end{aligned}
$$

A 95% prediction interval for X_{16} is given by

$$
(259 \quad , \quad 259 + 1853\frac{3.34}{14 \times 15})
$$

or

$(259 \quad , \quad 288.5)$

Thus the next failure will occur between 259 and 288.5 days from the start of the test, with 95% confidence.

b) Suppose in another test of 31 items we obtained results of $t_{(16)} = 2126$ and $x_{16} = 271$. When, with 90% confidence, will the 21^{st} item fail?

We adjust n, r and k for the two-parameter model, then using Table W we obtain $t_{.95;30,20,15} = .0096$ and $t_{.05;30,20,15} = .0563$ resulting in the desired prediction interval.

$$(\ 271 + (.0096)(2126) \quad , \quad 271 + (.0563)(2126) \ )$$

or

$$(291.4 \quad , \quad 390.7)$$

Thus, with 90% confidence, the 21^{st} failure will occur between 291.4 and 390.7 days.

c) If, in another test of 41 items, the 36^{th} item failed 30 days into the test and the total accumulated lifetime after the first failure until the 36^{th} failure was 823 days, with 99.5% confidence when will the last unit fail?

$$\begin{aligned} r - 1 = n - 1 &= 40 \\ k - 1 &= 35 \\ x_{36} &= 30 \\ t_{(36)} &= 823 \\ \alpha &= .005 \end{aligned}$$

Using Table W, adjusting for the two-parameter model, we obtain $t_{.005;40,40,35} = 0.2180$ thus we obtain the one-sided prediction interval,

$$\begin{aligned} X_{41} &\leq 30 + 0.2180 \times 823 \\ &= 209.4 \text{ days} \end{aligned}$$

We can expect the last item to fail within 209.4 days of the start of the test with 99.5% confidence.

6.2.2 Production Breakdowns

(Corresponding to section 5.2.2). Consider a computer hardware manufacturer who has developed a new CPU chip and wishes to go into production. The units are observed to each have an exponential breakdown time after an initial period of time during which they are not expected to breakdown. An initial test involving 40 chips found 5 breakdowns with the first occurring at 49 days, and an accumulated lifetime after the first breakdown until the fifth breakdown of 760 days. The manufacturer plans to produce the chips in lots of 30 units.

a) The manufacturer wishes to know, with 90% confidence, when the 5^{th} breakdown will occur in a randomly chosen lot.

$$\begin{aligned} t_{(5)} &= 760 \\ n &= 40 \\ m &= 30 \\ r &= 5 \\ s &= 5 \\ x_1 &= 49 \\ \alpha &= .1 \end{aligned}$$

Using Table F($s = 5$) we find $z_{1-.05} = 0.3282$ and $z_{1-.95} = 5.4201$. Therefore, a 90% prediction interval for Y_5 is given by

$$\begin{aligned} &(\ 49 + (.3282)(760/40) \ , \ 49 + (5.4201)(760/40) \ ) \\ &= \\ &(55.2 \ , \ 152.0) \end{aligned}$$

Therefore the manufacturer can expect the 5^{th} breakdown to occur between 55.2 and 152.0 days with 90% confidence.

b) If the manufacturer decided to produce chips in lots of 15 chips, with 97.5% confidence, what would be the total lifetime for the 15 chips in a lot.

$t_{(5)}, n, r$ and x_1 all as in part a).

$$\begin{aligned} m &= 15 \\ \alpha &= .025 \end{aligned}$$

From Table U we find $u_{1-.025} = 3.6255$, obtaining the one-sided 97.5% prediction interval,

$$\begin{aligned}\sum_{i=1}^{15} Y_i &\geq 15 \times 49 + 760\frac{15 \times 3.6255}{40} \\ &= 1768.3 \ \textit{days}\end{aligned}$$

Therefore the total accumulated lifetime for the 15 chips of a lot would be over 1768.3 days with 97.5% confidence.

6.3 Poisson Distribution Applications

A Gas meter manufacturer has noticed that over the last 4 months there have been a total of 20 defective meters produced. The manufacturer feels convinced that the number of failures per month are from a Poisson distribution with unknown constant failure rate λ. With an approximate confidence of 90% what will be the range of the number of breakdowns which will occur in the following month?

Setting $t = 4$ and $s = 1$ we obtain:

$$\begin{aligned}p &= s/(t+s) \\ &= 1/5 \\ &= .2\end{aligned}$$

With $r = 20$ and $\alpha = .1$, we wish to find a and b solving the system of equations arising from eqn. (42). Namely,

$$\begin{aligned}\sum_{i=0}^{a-1} \binom{20+a}{i} .2^i .8^{20+a-i} &\leq .05 \\ \sum_{i=0}^{b} \binom{20+b}{i} .2^i .8^{20+b-i} &\geq .95\end{aligned}$$

Using Table P we obtain values for a and b of 2 and 9 respectively giving,

$$\sum_{i=0}^{1} \binom{22}{i} .2^i .8^{22-i} = .048$$

$$\sum_{i=0}^{9} \binom{29}{i} .2^i .8^{29-i} = .951$$

Thus with 90% confidence the Gas Company can expect between 2 and 9 failures, inclusive, in the next month.

6.4 Erlang Distribution Applications

A defense contractor is testing 18 identical weapon systems, each of which possesses an Erlang distribution with $r = 2$. Owing to the expense involved, it would not be realistic to test all 18 systems sequentially thus the contractor stops the testing after observing the 6^{th} failure. If the total lifetime is 12,350 firings, with a 95% confidence how many firings would be necessary to test all 18 systems?

$$\begin{aligned} \alpha &= .05 \\ u &= 12,350 \\ k &= 6 \\ n &= 18 \end{aligned}$$

From standard tables of the F distribution we obtain $F_{.025;24,48} = 1.9438$ and $F_{.025;48,24} = 2.1134$. Using eqn. (45) we obtain the two-sided 95% prediction interval,

$$\begin{aligned} &(\ (\frac{12}{(6)(1.9438)} + 1)12350 \ , \ (\frac{(12)(2.1134)}{6} + 1)12350 \ ) \\ &= \\ &(25,057 \ , \ 64,551) \end{aligned}$$

Therefore, with 95% confidence, the total accumulated lifetime for all systems at the time of the 18^{th} failure is between 25,057 firings and 64,551 firings.

7 Conclusions

The generation of tables for most applications of prediction intervals involves the evaluation of lengthy and complicated series. The loss of precision which results from using computers to evaluate these functions make their computation prone to error in spite of modern, efficient CPUs. Consequently, it is impractical to attempt to generate tables for all possible values, thus reducing the scope of the tables. Additionally, the use of specialized computing languages with built-in algorithms for computing the necessary values efficiently and accurately, as well as the use of expensive mainframe CPU time is not readily available. Thus, the full value of prediction intervals as research tools will be difficult to fully realize.

FUTURE CONSIDERATIONS

Traditional computing methods offer little in terms of relief for the current problems. However, as a means of solving these problems it is suggested that the use of Neural Network computing be investigated.

Neural Network computing involves the construction of three computing layers, the first being the input layer, followed by the nodes or calculating layer and the last layer being the output layer. By feeding the Neural Network with input data the Neural Network iteratively adjusts the weights assigned to the nodes in order to produce the expected output, a process known as learning. Once the network has learned from the test data set it will construct a program which will allow outputs to be calculated directly from new input values without requiring iterations or convergence. The accuracy of the resultant program to compute the quantiles is dependent on the size of the test data set, with accuracy increasing proportionately with the size of the test data set.

The Kohonen model [20], developed by Teuvo Kohonen of Helsinki Technical University in Finland, may be the most appropriate Neural Network model to use due to its excellent ability to learn complex distributions. In the Kohonen model interior nodes are permitted to compete for the opportunity to contribute their weights to the output or to other interior nodes. This probabilistic nature gives the Kohonen model a serious advantage over other models when it comes to emulating probability distributions. If this research proves successful future evaluations of prediction intervals will no longer be restricted to the ranges of values presented

in a static table, thus enabling researchers to fully realize the value of prediction intervals as tools in their research.

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APPENDIX

A DEFINITIONS

Definition 1 *The Erlang distribution with parameters n and λ has the density function,*

$$f(t) = \frac{\lambda^n t^{n-1} e^{-\lambda t}}{(n-1)!}, \quad t > 0,\ n \text{ a positive integer},\ \lambda > 0$$

Definition 2 *Let X_i be independent identically distributed $\mathcal{N}(0,1)$ random variables, $i = 1, \ldots, n$. Then the random variable $Y = \sum_{i=1}^{n} X_i^2$ has a* chi-squared *distribution with n degrees of freedom. The density function of Y is given by,*

$$f_Y(y) = \frac{2^{-\frac{n}{2}} y^{\frac{n}{2}-1} exp\{-\frac{y}{2}\}}{\Gamma(\frac{n}{2})}, \quad y > 0$$

Definition 3 *A random variable X with positive parameters r and s, which has a density defined on $0 < x < 1$ as,*

$$b_{r,s}(x) = \frac{\Gamma(r+s) x^{r-1} (1-x)^{s-1}}{\Gamma(r)\Gamma(s)}$$

is said to have a beta distribution with parameters r and s.

B THEOREMS

The following Theorems are presented here for completeness only. References are provided for examples of the proofs.

Theorem 1 (UNIQUENESS) *The transform,*

$$\begin{aligned}\phi(x) &= E[e^{itx}] \\ &= \int_{-\infty}^{\infty} e^{itx}\ dF(x;\lambda,\theta) \\ &= \int_{-\infty}^{\infty} \cos(tx)\ dF(x;\lambda,\theta) + i\int_{-\infty}^{\infty} \sin(tx)\ dF(x;\lambda,\theta)\end{aligned}$$

defined for any distribution function $F(x;\lambda,\theta)$ is called the characteristic function. The characteristic function always exists and to each characteristic function there corresponds a unique distribution function having that characteristic function.

Reference: Lindgren [18, page 149]

Theorem 2 *If W has an Erlang distribution with parameters n and λ, the characteristic function for W is given by,*

$$\phi_W(t) = (1-\frac{it}{\lambda})^{-n}$$

Corollary: The Characteristic Function for the exponential distribution with parameter λ is given by,

$$\phi(t) = (1-\frac{it}{\lambda})^{-1}$$

Reference: Parzen [22, page 221]

Theorem 3 *If $X_1, X_2, \ldots, X_n$ are independent, $Erlang(r_i,\lambda)$, $i = 1,\ldots,n$, then $Y = \sum_{i=1}^{n} X_i$ is $Erlang(\sum_{i=1}^{n} r_i, \lambda)$.*

Reference: Ross [24, page 58]

Theorem 4 (Memoryless Property) *If X has an $Exp(\lambda)$ distribution, then the conditional probability that a failure will occur after time $t_\alpha + \tau$ given that there have been no failures in time t_α is the same as the probability that a failure will occur after time τ.*

Reference: Ross [24, page 203]

Theorem 5 *Consider a random sample from an $Exp(\lambda)$ distribution, and define $X_i, \quad i = 1, \ldots, n$, to be the i^{th} ordered time to failure. Define the time between successive failures by the random variable $W_k = X_k - X_{k-1}, \quad k = 2, \ldots, n$ and $W_1 = X_1$. Then the W_k's are independent and exponentially distributed with mean $[(n+1-k)\lambda]^{-1}$ and variance $[(n+1-k)^2\lambda^2]^{-1}$.*

Reference: Kendall and Stuart [13]

Theorem 6 (Rao-Blackwell) *Let $\underline{d} = d(X_1, \ldots, X_n)$ be an unbiased estimator of θ, that is, $E[\ \underline{d}\ ] = \theta$, and let $\underline{t} = t(X_1, \ldots, X_n)$ be a sufficient statistic for θ. Then*

(a) $E[\ \underline{d}\ |\ \underline{t}\ ]$ does not involve θ. Hence $E[\ \underline{d}\ |\ \underline{t}\ ]$ is a statistic and can be computed from the observed values,

(b) $E[\ \underline{d}\ |\ \underline{t}\ ]$ is an unbiased estimator of θ,

(c) $Var(E[\ \underline{d}\ |\ \underline{t}\ ]) \leq Var(\ \underline{d}\ )$.

Reference Lindgren [18, page 264]

Theorem 7 *Let $X_i, \quad i = 1, \ldots, n$ represent the i^{th} ordered times to failure of an $Exp(\lambda)$ random sample; then for $1 \leq r \leq n$ the statistic $T_r/r = [\sum_{i=1}^{r} X_i + (n-r)X_r]/r$ is a minimum variance unbiased estimator of the mean $(\mu = \frac{1}{\lambda})$.*

Reference: Epstein and Sobel [5]

Theorem 8 *Suppose that $X_i, \quad i = 1, \ldots, n$ are ordered observations from an $Exp(\lambda)$ distribution; then, for $1 \leq r \leq n$, $2\lambda T_r$ possesses a* chi-squared *distribution with $2r$ degrees of freedom, where $T_r = \sum_{i=1}^{r} X_i + (n-r)X_r$.*

Reference: Epstein and Sobel [5]

Theorem 9 *Consider n ordered $Exp(\lambda)$ observations, $X_1, \ldots, X_n$ and $k < r \leq n$. The random variables $\lambda(X_r - X_k)$ and λT_k are independently distributed and both distributions are independent of λ.*

Reference: Tanis [26]

Theorem 10 *In a random sample of size n from a distribution with cumulative distribution function $F(x; \lambda, \theta)$, the sampling distribution for the r^{th} order statistic, $r < n$, is given by,*

$$\frac{n!F(x_r)^{r-1}[1-F(x_r)]^{n-r}}{(r-1)!(n-r)!}\ dF(x_r)$$

Reference: David [2] and Hogg and Craig [11]

Theorem 11 *In a random sample of size n from a distribution with cumulative distribution function $F(x;\lambda,\theta)$, the joint sampling distribution of the k^{th} and r^{th} order statistics, for $k < r \leq n$, is given by*

$$\frac{n!F(x_k)^{k-1}[F(x_r)-F(x_k)]^{r-k-1}[1-F(x_r)]^{n-r}}{(k-1)!(r-k-1)!(n-r)!}\,dF(x_r)\,dF(x_k),\quad x_k < x_r$$

Reference: Kendall and Stuart [13], and Hogg and Craig [11]

Theorem 12 *Let X_i be ordered observations from an $Exp(\lambda)$ random sample, $i = 1,\ldots,n$. Then the random variable $Z = X_r - X_k$ has a distribution with density given by,*

$$f(z;\lambda) = \frac{(n-k)!\lambda[e^{-\lambda z}]^{n-r+1}[1-e^{-\lambda z}]^{r-k-1}}{(r-k-1)!(n-r)!},\quad z > 0$$

Reference: Lawless [14]

Theorem 13 *Let X_i be ordered observations from an $Exp(\lambda)$ random sample, $i = 1,\ldots,n$. For $k < r \leq n$ define $T_k = \sum_{i=1}^{k} X_i + (n-k)X_k$, and $Z = X_r - X_k$, then the joint distribution of Z and T_k is given by the joint density function,*

$$f(z,t_k;\lambda) = \frac{(n-k)!\lambda^{k+1}(t_k)^{k-1}(e^{-\lambda z})^{n-r+1}[1-e^{-\lambda z}]^{r-k-1}e^{-\lambda t_k}}{(k-1)!(r-k-1)!(n-r)!},\quad z > 0,\ t_k > 0$$

Reference: Lawless [14]

Theorem 14 *Let X_i be ordered observations from an $Exp(\lambda)$ random sample, $i = 1,\ldots,n$. For $k < r \leq n$ define $T_k = \sum_{i=1}^{k} X_i + (n-k)X_k$, and $Z = X_r - X_k$. Then the density of $U = Z/T_k$ is given by,*

$$f(u) = k\sum_{i=0}^{r-k-1}\frac{\binom{r-k-1}{i}(-1)^i(n-k)![1+u\phi_i]^{-(k+1)}}{(r-k-1)!(n-r)!},\quad u > 0$$

where

$$\phi_i = n-r+i+1$$

Reference: Lawless [14]

Theorem 15 *For $k < r \leq n$, and ordered $Exp(\lambda)$ observations $X_1, \ldots, X_n$, then the random variables $(X_r - X_k)$ and X_k are independently distributed.*

Reference: Tanis [26]

Theorem 16 *Let X_i, $i = 1, \ldots, n$, represent the i^{th} ordered time to failure from an exponential random variable with parameter λ, then the statistic, $T_n = \sum_{i=1}^{n} X_i$ is sufficient for $\mu = \frac{1}{\lambda}$.*

Reference: Kendall and Stuart [13]

Theorem 17 *Let X be a Poisson random variable with parameter λ and define T_r to be the waiting time to the r^{th} failure. Then T_r possesses an Erlang distribution with parameters r and λ.*

Reference: Parzen [22, page 261]

C LEMMAS

Lemma 1 *Let X be a random variable which possesses an Erlang distribution with parameters r and λ. Define $n = 2r$ and $\sigma^2 = \frac{1}{2\lambda}$, then for $x > 0$, X has the density,*

$$\begin{aligned} f_X(x) &= \frac{\lambda^r x^{r-1} e^{-\lambda x}}{\Gamma(r)} \\ &= (2\sigma^2)^{-\frac{n}{2}} x^{\frac{n}{2}-1} exp\{-\frac{x}{2\sigma^2}\}/\Gamma(\frac{n}{2}) \\ &= 2^{-\frac{n}{2}} \sigma^{-n} x^{\frac{n}{2}-1} exp\{-\frac{x}{2\sigma^2}\}/\Gamma(\frac{n}{2}) \end{aligned}$$

which is the density function for the chi-squared *distribution with parameters $n = 2r$ and $\sigma^2 = \frac{1}{2\lambda}$.*

Lemma 2 *If the random variable X has an Erlang distribution with parameters* 1 *and λ, then X also has an exponential distribution with parameter λ.*

Set $r = 1$ in definition 1, then for $x > 0$,

$$\begin{aligned} f_X(x) &= \frac{\lambda^1 x^0 e^{-\lambda x}}{\Gamma(1)} \\ &= \lambda e^{-\lambda x} \end{aligned}$$

which is the density function for the exponential distribution with parameter λ.

D TABLE GENERATION

The tables presented in the Appendices were developed using Microsoft QBasic on an IBM PC compatible platform with 486DX33 and 486DX2-66 CPUs. All calculations were performed in double precision and convergence was declared when successive estimates differed by less than 10^{-6}. Efforts were made to minimize the impact of rounding and truncation errors, however owing to the oftentimes numerous calculations required at each stage, it was decided that an accuracy of 10^{-4} was realistic for practical usage.

Convergence on the zeroes of the distributions was achieved using the bisection method. Higher powered techniques, such as Newton-Raphson and Haley's method, were found to be unstable in the region of the zero often resulting in divergence. Investigation of this phenomena led to the discovery of unusual curvatures in many of the functions in the vicinity of the zeroes resulting in near zero evaluations of second order and higher derivatives. Consequently the bisection method was found to be the most reliable. To compensate for the often slow convergence rate of this method, previously calculated quantiles were used as part of the initial bounds for the next quantile in the implicit cases.

E PROGRAM CODE

TABLES W, K, F AND U

Program listing for calculating Tables W, K, F and U.

```
REM: declare double precision
DEFDBL D
DECLARE SUB dfac ()
DECLARE SUB dchoose ()
DECLARE SUB df ()
DECLARE SUB dc ()
REM: these variables will be shared among the subroutines and main program
COMMON SHARED p3%, cu%, cl%, p1%, in%, inl%, inu%, p2%, dz, ti%, dfo,
dout, dchout, dzout, s%, dcout
DIM p1list%(19), da(10), tname$(4), par$(4, 3), dans(100, 10)
ON ERROR GOTO lerr
REM: prepare output file
OPEN (insert output path and file name) FOR APPEND AS #1
REM: data statements for the values of n and α
DATA 3,4,5,6,7,8,9,10,12,15,20,25,30,35,40,50,60,80,100
DATA .005,.01,.025,.05,.1,.9,.95,.975,.99,.995
tname$(1) = "TABLE K"
tname$(2) = "TABLE U"
tname$(3) = "TABLE W"
tname$(4) = "TABLE F"
par$(1, 1) = "k": par$(1, 2) = "m": par$(1, 3) = "s"
par$(2, 1) = "n": par$(2, 2) = "r": par$(2, 3) = "m"
par$(3, 1) = "n": par$(3, 2) = "r": par$(3, 3) = "k"
par$(4, 1) = "n": par$(4, 2) = "r": par$(4, 3) = "m"
FOR i% = 1 TO 19
READ p1list%(i%)
NEXT i%
```

```
lalph$ = ""
FOR i% = 1 TO 10
READ da(i%)
lalph$ = lalph$ + " & " + STR$(da(i%))
NEXT i%
REM: increment for each of tables K, U, W and F
FOR ti% = 1 TO 4
s% = 1
lta4: IF ti% = 4 THEN s% = s% + 1
IF s% > 5 GOTO le4
WRITE #1, tname$(ti%)
IF ti% = 4 THEN WRITE #1, STR$(s%)
PRINT "Writing " + tname$(ti%)
IF ti% = 4 THEN PRINT " for s=" + STR$(s%)
REM: obtain value of first parameter
FOR c% = 1 TO 19
p1% = p1list%(c%)
IF (ti% = 1 OR ti% = 4) AND p1% < 5 GOTO lln
IF ti% = 2 AND p1% > 40 GOTO lln
IF ti% = 3 AND p1% < 4 GOTO lln
WRITE #1, par$(ti%, 1) + "=" + STR$(p1%)
lin$ = par$(ti%, 2) + " & " + par$(ti%, 3)
lin$ = lin$ + lalph$
WRITE #1, lin$
REM: determine step, start and stop values for second parameter
IF ti% = 1 THEN str% = 5: ste% = 5: IF p1% < 20 THEN sto% = 15: ELSE
sto% = p1%: ELSE str% = 3: ste% = 1: sto% = p1%
IF ti% = 3 THEN str% = 4: ste% = 1: sto% = p1%
FOR p2% = str% TO sto% STEP ste%
IF (ti% = 2 OR ti% = 4) AND p2% > 5 THEN p2% = p2% + 4
IF ti% = 3 AND p2% > 6 THEN p2% = p2% + 1
IF ti% = 3 AND p2% > 10 THEN p2% = p2% + 3
IF p2% > sto% THEN p2% = sto%
REM: set up step values and starting value for third parameter
IF ti% = 1 THEN str3% = 2: sto3% = p2% - 1: ste3% = 1
IF (ti% = 2 OR ti% = 4) THEN str3% = 5: sto3% = 40: ste3% = 5
IF ti% = 3 THEN str3% = 1: sto3% = p2% - 2: ste3% = 1
row% = 0
```

```
FOR p3% = str3% TO sto3% STEP ste3%
row% = row% + 1
IF p3% = str3% THEN lin$ = STR$(p2%) + " & " ELSE lin$ = " & "
IF ti% = 3 GOTO lzip
IF ti% = 1 AND p3% > 5 THEN p3% = p3% + 4
IF p3% > sto3% THEN p3% = sto3%
lin$ = lin$ + STR$(p3%)
GOTO lbp
lzip: IF p3% > 10 THEN p3% = p3% + 4
IF p3% > p2% - 2 THEN p3% = p2% - 2
lin$ = lin$ + STR$(p3%)
lbp:
REM: compute quantile for each alpha value
FOR col% = 1 TO 10
dalph = da(col%)
IF ti% = 3 THEN dal = dalph ELSE dal = 1 - dalph
REM: for table U test for non-positive u, for table F test for non-positive z
ON ti% GOTO lfind, lfn2, lfind, lfn4
lfn2: dzf = 1 - ((1 + p1% / p3%)^p3% * dalph)^(1 / (1 - p2%))
IF dzf ≤ 0 THEN GOTO lans ELSE GOTO lfind
lfn4: dc: dout = dcout
dzf = 1 - (dalph / dout)^(1 / (1 - p2%))
IF dzf ≤ 0 THEN GOTO lans ELSE GOTO lfind
REM: set up initial interval to [10^-6, 2] or use previous quantile
lfind: IF dans(row%, col% - 1) > 0 AND ti% <> 3 GOTO lin2
dzl = 10^(-6): dzr = 2
GOTO lcc
lin2: dzl = dans(row%, col% - 1): dzr = 3 * dans(row%, col% - 1)
lcc: cnt% = 0
REM: evaluate the function at the end points
dz = dzl: df: dfl = dzout - dal
ltry: dz = dzr: df: dfr = dzout - dal
REM: check for opposite signs - adjust interval if signs are the same
IF dfl * dfr < 0 GOTO lloop
dzl = dzr: dfl = dfr: dzr = dzr * 2
IF dzr > 10^5 GOTO lerr
GOTO ltry
REM: calculate midpoint and evaluate function
```

```
lloop: dzn = (dzr + dzl) / 2
dz = dzn: df: dfn = dzout - dal
REM: stop process when subsequent estimates are within acceptable limits
IF ABS(dzn - dzl) < .000001 THEN dzf = dzn: GOTO lans
REM: replace interval end with same sign by midpoint
IF dfn * dfl < 0 THEN dzr = dzn: dfr = dfn ELSE dzl = dzn: dfl = dfn
cnt% = cnt% + 1
REM: print error message if no convergence within 200 iterations
IF cnt% < 201 GOTO lloop
lerr: lin$ = lin$ + "& ****"
PRINT p1%, p2%, p3%, dalph, "ERROR"
0 GOTO lby
REM: print values to file
lans: tak% = 4
dans(row%, col%) = dzf
lin$ = lin$ + " & " + STR$(INT(dzf * 10^tak% + .5))
PRINT p1%, p2%, p3%, dalph, dzf
lby: NEXT col%
WRITE #1, lin$
NEXT p3%
NEXT p2%
lln: NEXT c%
IF ti% = 4 GOTO lta4
le4: NEXT ti%

SUB dc
dcout = 1
FOR ic% = 0 TO s% - 1
dcout = dcout * (p3% - ic%) / (p1% + p3% - ic%)
NEXT ic%
END SUB

SUB dchoose
REM computes cu choose cl
dchout = 1
IF cl% = 0 OR cl% = cu% GOTO lo
IF cl% = 1 OR cl% = cu% - 1 THEN dchout = cu%: GOTO lo
FOR j% = 1 TO cu%
```

```
dchout = dchout * j%
NEXT j%
FOR j% = 1 TO cl%
dchout = dchout / j%
NEXT j%
FOR j% = 1 TO cu% - cl%
dchout = dchout / j%
NEXT j%
lo:
END SUB

SUB df
dzout = 0
ON ti% GOTO lk, lu, lw, lf
lk:
FOR jj% = p2% - p3% + 1 TO p2%
dacc = 0
cu% = p2%: cl% = jj%: dchoose: dtmp = dchout: d1 = -1
FOR ii% = 0 TO p2% - jj%
d1 = -d1
cu% = p2% - jj%: cl% = ii%: dchoose: dout = dchout
dacc = dacc + d1 * dout / (1 + (jj% + ii%) * dz / p1%)^p1%
NEXT ii%
dzout = dzout + dtmp * dacc
NEXT jj%
GOTO ldzo
lu: FOR jj% = 0 TO p3% - 1
cu% = p2% + jj% - 2: cl% = jj%: dchoose: d1 = dchout
dzout = dzout + d1 * ((p3% * dz / p1%)^jj%) * (1 - (1 + p1% / p3%)^(jj% -
p3%)) / ((1 + p3% * dz / p1%)^(p2% + jj% - 1))
NEXT jj%
GOTO ldzo
lw: IF p2% = p1% GOTO lw3
cu% = p1% - p3%: cl% = p2% - p3%: dchoose: dtmp = dchout
d1 = -1: cu% = p2% - p3%
FOR ii% = 1 TO cu%
d1 = -d1
cl% = ii%: dchoose: dout = dchout
```

```
in% = p1% - p2% + ii%
dzout = dzout + d1 * dout * ii% / ((1 + in% * dz)^p3% * in%)
NEXT ii%
dzout = dzout * dtmp
GOTO ldzo
lw3: d1 = -1: cu% = p1% - p3%
FOR ii% = 1 TO cu%
d1 = -d1: cl% = ii%: dchoose: dout = dchout
dzout = dzout + d1 * dout / (1 + ii% * dz)^p3%
NEXT ii%
GOTO ldzo
lf: FOR kk% = 0 TO s% - 1
phi% = p3% - s% + kk% + 1
cu% = s%: cl% = kk%: dchoose: dout = dchout
dzout = dzout + (-1)^kk% * dout * (s% - kk%) * ((1 + dz * phi% / p1%)^(1 -
p2%)) / (phi% * (phi% + p1%))
NEXT kk%
cu% = p3%: cl% = s%: dchoose: dout = dchout
dzout = dzout * p1% * dout
ldzo:
END SUB

SUB dfac
dfo = 1
FOR ifi% = 1 TO in%
dfo = dfo * ifi%
NEXT ifi%
END SUB
```

TABLE P

Table P requires convergence of both the lower and upper limits of the desired interval, thus the program used to generate this table is significantly different from the previous program.

```
DEFDBL D
DECLARE SUB dchoose ()
DECLARE SUB df ()
DECLARE SUB dc ()
DECLARE SUB di ()
DIM da(8)
COMMON SHARED ba%, cu%, cl%, dp, r%, aa%, dchout, diout, dzout
DATA .1,.075,.05,.01
REM: Set up α
FOR i% = 1 TO 4
READ da(i%)
NEXT i%
FOR dp = .95 TO .05 STEP -.05
FOR r% = 1 TO 30
IF r% > 5 THEN r% = r% + 4
FOR ca% = 1 TO 4
dalph = da(ca%)
IF (1 - dp) / (r% + 1) > dalph / 2 GOTO lnoan
lfind: al% = 1: ar% = 4
aa% = al%
REM: Evaluate distribution function for given parameters at the point of interest
df
dfl = dzout - dalph / 2
ltry: aa% = ar%
df
dfr = dzout - dalph / 2
IF dfl * dfr < 0 GOTO lloop
```

```
al% = ar%: dfl = dfr: ar% = ar% * 2
GOTO ltry
lloop: an% = INT((ar% + al% + 1) / 2)
REM: Evaluate distribution function for given parameters at the point of interest
aa% = an%
df
dfn = dzout - dalph / 2
IF an% - al% = 1 GOTO lgota
IF dfn * dfl < 0 THEN ar% = an%: dfr = dfn: ELSE al% = an%: dfl = dfn
IF al% - ar% = 1 THEN ansa% = al%: GOTO lfindb
GOTO lloop
lgota: IF dfn * dfl < 0 THEN ansa% = al%: ELSE ansa% = an%
lfindb: bl% = ansa%: br% = ansa% * 2
ba% = bl%
di
dfl = diout - 1 + dalph / 2
ltryb: ba% = br%
di
dfr = diout - 1 + dalph / 2
IF dfl * dfr < 0 GOTO lloopb
bl% = br%: dfl = dfr
IF br% > 300 THEN br% = br% + 50: ELSE br% = br% * 2
IF br% > 600 GOTO lbig
GOTO ltryb
lloopb: bn% = INT((br% + bl%) / 2)
ba% = bn%
di
dfn = diout - 1 + dalph / 2
IF bn% - br% = 1 GOTO lgotb
IF dfn * dfl < 0 THEN br% = bn%: dfr = dfn: ELSE bl% = bn%: dfl = dfn
IF br% - bl% = 1 THEN ansb% = br%: GOTO lans
GOTO lloopb
lgotb: IF dfn * dfl < 0 THEN ansb% = bn%: ELSE ansb% = br%
REM: PRINT error message and continue
lnoan: PRINT " no answer"
GOTO lcon
REM: PRINT error message and continue
lbig: PRINT " large b"
```

```
GOTO lcon
REM: PRINT answer
lans:
lcon: NEXT ca%
NEXT r%
NEXT dp

SUB dc
dout = 1
FOR j% = 1 TO r% - kk% - 1
dout = dout * j%
NEXT j%
FOR j% = 1 TO n% - r%
dout = dout * j%
NEXT j%
FOR j% = 1 TO n% - kk%
dout = dout / j%
NEXT j%
END SUB

SUB dchoose
dchout = 1
IF cl% = 0 OR cl% = cu% GOTO lo
IF cl% = 1 OR cl% = cu% - 1 THEN : dchout = cu%: GOTO lo
IF cl% < cu% - cl% THEN jj% = cl%: ELSE jj% = cu% - cl%
FOR j% = 1 TO jj%
dchout = dchout * (cu% - jj% + j%) / j%
NEXT j%
lo:
END SUB

SUB df
dzout = 0
cu% = r% + aa%
FOR i% = 0 TO aa% - 1
cl% = i%
dchoose
dzout = dzout + dchout * dp^i% * (1 - dp)  (r% + aa% - i%)
```

```
NEXT i%
END SUB

SUB di
diout = 0
cu% = r% + ba%
FOR i% = 0 TO ba%
cl% = i%
dchoose
diout = diout + dchout * dp^i% * (1 - dp)  (r% + ba% - i%)
NEXT i%
END SUB
```

F TABLE W: Within Sample Quantiles for the One- or Two-Parameter Exponential Distribution

Explanation of the Tables

Table W gives the quantiles, $t_{\alpha;n,r,k} \times 10^4$, at various α levels of significance, for the r^{th} future observation from an One-Parameter Exponential random sample of size n where the test has been censored after the k^{th} failed unit. Note that $k < r \leq n$. That is,

$$Pr[(X_r - X_k)/T_k \leq t_{\alpha;n,r,k}] = 1 - \alpha$$

where X_r and X_k are the times to failure of the r^{th} and k^{th} failed units, respectively, and

$$T_k = \sum_{i=1}^{k} X_i + (n-k)X_k \ .$$

NOTE: The values given in these tables must be divided by 10^4 in order to obtain the proper quantile.

ADJUSTMENTS FOR THE TWO-PARAMETER EXPONENTIAL DISTRIBUTION

To use these tables for the Two-Parameter Exponential distribution replace r with $r-1$, n with $n-1$ and k with $k-1$. Thus if the two-parameter sample size is 5, the future observation is 5, and the censoring number is 2, use the table for $n=4$ and the row for $r=4$ and $k=1$, then cross-index with the value of α to obtain the quantile. That is,

$$Pr[(X_r - X_k)/T_{(k)} \leq t_{\alpha;n-1,r-1,k-1}] = 1-\alpha$$

where X_r and X_k are the times to failure of the r^{th} and k^{th} failed units, respectively, and

$$T_{(k)} = \sum_{i=1}^{k}(X_i - X_1) + (n-k)(X_k - X_1) \ .$$

TABLE W: Within Sample Quantiles for the One- or Two-Parameter Exponential Distribution

n= 4		α									
r	k	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
4	1	3653782	1820443	720426	353730	170335	5000	3333	2343	1545	1155
	2	176334	121524	72870	48325	30934	1749	1119	742	445	306

n= 5		α									
r	k	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
4	1	2159291	1075954	425943	209256	100882	3060	2052	1450	960	720
	2	97013	66910	40185	26699	17139	999	641	426	256	177
5	1	4152826	2069486	819465	402762	194353	6267	4320	3146	2179	1695
	2	205978	142307	85780	57255	37030	2704	1880	1359	919	696
	3	61722	46828	31730	22991	16026	1193	772	516	311	215

n= 6		α									
r	k	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
4	1	1561384	778048	308039	151358	72994	2235	1502	1062	705	529
	2	67726	46721	28073	18661	11988	705	453	301	181	125
5	1	2558439	1275101	505086	248395	120010	4013	2787	2041	1423	1111
	2	120073	83040	50157	33559	21783	1662	1161	843	572	435
	3	33730	25631	17416	12657	8859	682	443	297	179	124
6	1	4552037	2268696	898671	441963	213543	7278	5114	3798	2705	2150
	2	228276	157928	95470	63946	41588	3445	2488	1872	1336	1057
	3	70345	53597	36612	26772	18919	1871	1322	967	661	503
	4	34145	27070	19402	14647	10627	906	591	396	240	166

n= 7		α									
r	k	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
4	1	1229191	612523	242516	119171	57480	1767	1189	841	556	419
	2	52187	36005	21638	14387	9245	545	350	233	140	97
5	1	1893976	943972	373961	183943	88904	3006	2092	1536	1073	839
	2	86473	59820	36154	24207	15730	1215	851	619	420	320
	3	23502	17867	12151	8838	6193	481	313	209	127	88
6	1	2891050	1441044	571028	280999	135939	4811	3407	2548	1828	1460
	2	138483	95911	58108	39022	25478	2217	1613	1220	876	695
	3	40604	31001	21257	15606	11089	1152	819	601	412	315
	4	18573	14757	10617	8046	5867	519	339	228	138	96
7	1	4884698	2434689	964662	474616	229521	8116	5773	4343	3147	2536
	2	246193	170474	103245	69309	45235	4042	2985	2296	1690	1369
	3	76816	58670	40263	29595	21074	2405	1770	1350	976	778
	4	38349	30566	22124	16883	12442	1434	1023	753	517	395
	5	22905	18614	13773	10644	7903	731	478	322	195	135

TABLE W (Continued)

n= 8		α									
r	k	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
4	1	1015633	506107	200387	98473	47500	1464	985	697	463	348
	2	42499	29322	17623	11719	7532	445	286	190	114	79
5	1	1514255	754728	299005	147085	71101	2416	1684	1237	865	677
	2	67955	47016	28423	19037	12376	961	674	490	333	253
	3	18095	13759	9361	6811	4775	372	242	162	98	68
6	1	2179048	1086187	430459	211866	102534	3673	2608	1955	1406	1125
	2	102030	70687	42855	28802	18828	1664	1213	919	661	525
	3	29153	22273	15290	11239	7999	843	600	441	303	231
	4	12923	10275	7401	5615	4100	366	239	161	98	68
8	1	5169825	2576958	1021215	502594	243206	8830	6335	4808	3526	2869
	2	261186	180969	109743	73787	48277	4540	3400	2654	1992	1638
	3	82018	62745	43192	31855	22796	2837	2139	1671	1248	1020
	4	41490	33175	24152	18545	13789	1853	1379	1060	772	618
	5	25480	20833	15585	12187	9203	1164	835	617	425	326
	6	17022	14054	10612	8327	6275	613	402	271	165	114

n= 9		α									
r	k	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
4	1	866139	431614	170895	83982	40512	1250	841	596	396	297
	2	35864	24745	14873	9891	6358	376	242	161	97	67
5	1	1265055	630528	249806	122889	59410	2024	1411	1037	726	568
	2	56096	38814	23468	15720	10222	796	558	406	276	210
	3	14730	11201	7622	5547	3890	304	198	132	80	55
6	1	1763681	879154	348429	171506	83016	2990	2126	1595	1149	920
	2	81399	56402	34205	22997	15041	1338	977	741	533	424
	3	22880	17485	12009	8832	6290	667	475	349	240	183
	4	9944	7909	5699	4326	3161	283	185	125	76	52
8	1	3425583	1707719	676984	333378	161519	6092	4408	3370	2492	2039
	2	167033	115862	70421	47476	31188	3093	2336	1836	1388	1147
	3	50617	38816	26836	19884	14318	1892	1438	1130	850	697
	4	24668	19791	14493	11193	8385	1198	897	693	508	407
	5	14525	11921	8974	7061	5373	718	518	384	266	204
	6	9205	7623	5786	4562	3459	351	231	156	95	66
9	1	5419305	2701438	1070693	527069	255174	9451	6824	5213	3857	3160
	2	274085	189994	115328	77634	50887	4965	3756	2961	2253	1873
	3	86376	66156	45640	33743	24232	3199	2450	1943	1482	1231
	4	44010	35266	25774	19873	14863	2195	1674	1319	994	816
	5	27396	22482	16928	13330	10164	1510	1131	874	640	513
	6	18811	15632	11943	9488	7279	980	706	523	362	277
	7	13465	11238	8606	6824	5198	528	347	234	142	99

TABLE W (Continued)

n= 10		α									
r	k	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
4	1	755402	376432	149047	73246	35334	1091	734	520	345	259
	2	31030	21410	12869	8559	5502	326	209	139	84	58
5	1	1087842	542205	214817	105679	51093	1744	1216	894	626	490
	2	47813	33084	20005	13402	8716	680	477	347	236	180
	3	12427	9451	6431	4681	3283	257	167	112	68	47
6	1	1486760	741122	293732	144590	69994	2529	1799	1351	973	780
	2	67924	47069	28550	19198	12560	1122	819	622	448	356
	3	18874	14426	9911	7291	5194	553	394	290	199	152
	4	8092	6437	4640	3523	2574	231	151	102	62	43
8	1	2650196	1321223	523825	258004	125050	4777	3467	2657	1971	1616
	2	127031	88145	53613	36175	23795	2401	1819	1433	1087	900
	3	37803	29011	20085	14903	10752	1449	1104	869	655	538
	4	18058	14504	10640	8233	6182	900	676	523	384	308
	5	10388	8536	6439	5075	3871	526	380	282	195	150
	6	6393	5300	4029	3181	2416	248	163	110	67	47
10	1	5641060	2812081	1114667	548819	265807	10000	7257	5571	4151	3418
	2	285407	197915	120227	81006	53174	5335	4067	3231	2483	2079
	3	90130	69094	47747	35365	25464	3509	2717	2179	1686	1416
	4	46122	37016	27130	20982	15758	2481	1924	1541	1187	991
	5	28930	23800	18001	14241	10928	1792	1378	1092	828	682
	6	20135	16800	12926	10346	8019	1274	960	744	547	439
	7	14807	12444	9647	7749	6011	846	611	454	314	241
	8	11102	9340	7227	5775	4433	463	305	206	125	87

TABLE W (Continued)

n= 12		α									
r	k	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
4	1	602022	300001	118786	58376	28162	870	586	415	276	207
	2	24450	16871	10141	6745	4336	257	165	110	66	46
5	1	851362	424340	168123	82711	39991	1367	954	702	491	385
	2	36962	25577	15467	10363	6741	527	370	269	183	139
	3	9474	7205	4904	3570	2504	196	128	85	52	36
6	1	1136318	566439	224505	110518	53506	1939	1381	1037	748	599
	2	51213	35492	21531	14481	9477	850	621	471	340	270
	3	14016	10714	7363	5418	3861	412	294	216	149	114
	4	5905	4697	3387	2572	1880	169	111	74	45	31
8	1	1867684	931136	369198	181870	88174	3401	2474	1900	1413	1160
	2	87861	60981	37110	25055	16496	1687	1281	1011	768	637
	3	25623	19675	13635	10127	7317	1000	763	602	455	374
	4	11967	9619	7066	5474	4117	607	457	354	260	209
	5	6707	5516	4166	3288	2512	345	249	185	128	99
	6	3999	3317	2524	1995	1517	156	103	70	42	29
10	1	3031136	1511252	599307	295300	143246	5667	4161	3228	2434	2020
	2	146776	101928	62101	41989	27708	2987	2305	1849	1437	1212
	3	44396	34144	23733	17687	12843	1925	1508	1221	955	807
	4	21755	17545	12966	10111	7675	1323	1037	838	652	547
	5	13038	10792	8245	6586	5116	919	714	571	436	361
	6	8628	7248	5637	4558	3578	620	471	368	272	219
	7	5978	5057	3961	3213	2522	383	278	208	144	111
	8	4150	3509	2736	2202	1705	187	124	84	51	35
12	1	6022064	3002175	1190214	586178	284066	10937	7994	6183	4651	3859
	2	304604	211341	128526	86714	57041	5958	4589	3683	2870	2428
	3	96377	73977	51244	38058	27506	4020	3158	2569	2026	1726
	4	49540	39847	29320	22769	17199	2943	2329	1903	1504	1281
	5	31317	25851	19666	15652	12111	2235	1769	1443	1136	963
	6	22077	18510	14363	11596	9096	1720	1353	1095	853	717
	7	16587	14040	11023	8970	7084	1314	1020	814	622	514
	8	12945	11017	8699	7101	5616	972	737	574	424	341
	9	10300	8781	6938	5653	4449	665	482	359	249	192
	10	8183	6959	5461	4410	3422	372	246	166	101	70

TABLE W (Continued)

n= 15		α									
r	k	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
4	1	461823	230137	91124	44782	21604	668	450	319	212	159
	2	18557	12805	7697	5119	3291	195	125	83	50	35
5	1	643167	320572	127012	62486	30213	1034	722	531	372	291
	2	27610	19106	11555	7742	5036	394	277	201	137	104
	3	6989	5316	3618	2634	1848	145	94	63	38	26
6	1	842645	420049	166487	81960	39682	1441	1027	772	557	446
	2	37522	26004	15777	10613	6946	624	456	346	250	199
	3	10133	7747	5324	3918	2793	299	213	157	108	82
	4	4205	3346	2413	1832	1340	121	79	53	32	22
8	1	1313627	654919	259688	127933	62033	2404	1751	1346	1003	824
	2	60903	42276	25733	17379	11447	1178	895	707	538	446
	3	17484	13429	9310	6918	5002	688	526	415	314	258
	4	8026	6453	4743	3677	2767	411	309	240	176	142
	5	4410	3628	2742	2166	1655	228	165	123	85	65
	6	2570	2132	1623	1283	976	101	66	45	27	19
10	1	1931033	962800	381850	188184	91318	3658	2694	2096	1586	1319
	2	91642	63661	38812	26262	17351	1903	1473	1186	924	781
	3	27143	20889	14538	10849	7892	1207	948	770	604	511
	4	13004	10499	7773	6072	4620	813	639	518	404	339
	5	7603	6301	4824	3862	3007	551	429	344	263	218
	6	4892	4115	3208	2600	2046	361	275	215	159	128
	7	3280	2778	2181	1772	1394	214	156	117	81	62
	8	2187	1851	1446	1165	903	100	66	45	27	19
15	1	6484431	3232856	1281680	631502	306210	12064	8881	6917	5252	4389
	2	327562	227390	138440	93528	61650	6692	5205	4218	3327	2842
	3	103697	79696	55335	41198	29884	4610	3668	3021	2422	2087
	4	53437	43071	31808	24796	18829	3461	2785	2313	1867	1615
	5	33940	28099	21487	17192	13398	2717	2198	1831	1482	1283
	6	24102	20289	15854	12890	10207	2186	1771	1475	1192	1030
	7	18309	15582	12346	10142	8112	1781	1439	1195	961	827
	8	14528	12454	9958	8232	6623	1455	1169	965	768	656
	9	11869	10223	8219	6819	5500	1181	939	767	602	508
	10	9885	8536	6880	5714	4608	940	735	591	453	376
	13	5844	5018	3988	3251	2547	288	190	129	79	55

TABLE W (Continued)

n= 20		α									
r	k	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
4	1	332907	165895	65687	32282	15574	482	324	230	153	115
	2	13243	9138	5493	3654	2349	139	89	60	36	25
5	1	457585	228073	90364	44457	21497	737	514	378	265	208
	2	19439	13452	8136	5451	3547	278	195	142	97	73
	3	4865	3700	2519	1834	1286	101	66	44	27	18
6	1	590574	294396	116686	57444	27814	1011	721	542	391	313
	2	26011	18028	10938	7358	4817	433	317	241	174	138
	3	6942	5308	3648	2685	1914	205	146	108	74	57
	4	2844	2263	1632	1240	906	82	53	36	22	15
8	1	886511	441980	175257	86342	41869	1627	1186	912	680	559
	2	40602	28185	17159	11590	7636	788	600	474	361	299
	3	11505	8838	6128	4555	3294	455	348	275	208	171
	4	5207	4187	3079	2387	1797	268	201	156	115	92
	5	2817	2318	1752	1384	1058	146	106	79	55	42
	6	1613	1339	1019	806	613	63	42	28	17	12
10	1	1234092	615318	244047	120280	58375	2350	1733	1350	1023	852
	2	57739	40114	24462	16557	10944	1209	937	755	589	499
	3	16846	12968	9030	6742	4908	756	595	484	380	322
	4	7943	6415	4752	3715	2829	501	395	320	250	210
	5	4563	3784	2899	2322	1810	334	260	209	160	133
	6	2880	2424	1891	1533	1208	214	163	128	95	76
	7	1890	1601	1258	1023	805	124	91	68	47	36
	8	1229	1040	813	655	508	56	37	25	15	11
15	1	2521971	1257560	498900	245991	119494	5000	3736	2949	2275	1922
	2	121521	84499	51621	35016	23223	2752	2176	1788	1433	1237
	3	36774	28370	19835	14875	10899	1869	1512	1263	1028	895
	4	18143	14711	10975	8643	6650	1376	1126	948	777	679
	5	11038	9211	7136	5782	4578	1054	867	732	601	526
	6	7505	6379	5062	4176	3366	824	678	572	469	409
	7	5450	4689	3781	3156	2573	648	532	447	364	316
	8	4123	3576	2914	2450	2012	507	413	345	278	240
	9	3197	2788	2285	1930	1589	390	315	260	206	175
	10	2511	2195	1804	1525	1255	291	230	187	145	121
	13	1143	988	794	654	518	62	41	28	17	12
20	1	7075481	3527727	1399041	689421	334496	13489	10000	7843	6010	5057
	2	356519	247627	150930	102104	67444	7602	5969	4880	3895	3356
	3	112769	86777	60390	45075	32813	5326	4287	3571	2903	2529
	4	58156	46969	34811	27237	20786	4076	3327	2800	2300	2016
	5	37022	30737	23618	18989	14897	3272	2693	2281	1885	1658
	6	26394	22300	17533	14344	11452	2706	2239	1903	1578	1390
	7	20164	17240	13766	11395	9207	2281	1892	1611	1338	1179
	8	16128	13904	11224	9367	7630	1948	1617	1377	1143	1006
	9	13320	11552	9398	7888	6462	1677	1391	1183	980	861
	10	11260	9808	8022	6760	5558	1449	1200	1018	839	735
	15	5830	5108	4199	3540	2900	638	503	406	313	261
	18	3945	3416	2746	2258	1784	209	138	94	57	40

TABLE W (Continued)

n= 25		α									
r	k	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
4	1	260328	129728	51366	25244	12179	377	254	180	119	90
	2	10297	7105	4271	2841	1826	108	70	46	28	19
5	1	355322	177103	70169	34522	.16693	572	399	294	206	161
	2	15006	10384	6280	4208	2738	215	151	110	75	57
	3	3732	2839	1932	1407	987	77	50	34	20	14
6	1	453066	226846	89913	44264	21432	780	556	418	302	242
	2	19921	13807	8377	5636	3689	332	243	184	133	106
	3	5282	4039	2776	2043	1457	156	111	82	56	43
	4	2149	1710	1233	937	685	62	40	27	16	11
8	1	670885	334478	132631	65343	31687	1232	898	691	515	424
	2	30526	21191	12901	8715	5742	593	451	357	272	225
	3	8590	6599	4576	3402	2460	340	260	205	155	128
	4	3859	3104	2282	1770	1333	199	149	116	85	69
	5	2072	1705	1289	1018	779	108	78	58	40	31
	6	1176	976	743	588	447	46	30	21	13	9
10	1	912909	455178	180535	88979	43186	1741	1285	1001	759	632
	2	42407	29464	17969	12163	8041	890	690	556	434	368
	3	12281	9455	6584	4917	3580	553	435	354	278	235
	4	5745	4640	3438	2688	2047	364	286	232	181	153
	5	3273	2714	2080	1666	1299	240	187	150	115	95
	6	2047	1723	1344	1090	859	153	116	91	67	54
	7	1330	1127	885	720	567	88	64	48	33	26
	8	855	724	566	456	354	39	26	18	11	7
15	1	1689421	842427	334222	164806	80069	3369	2521	1993	1540	1303
	2	80578	56037	34242	23235	15418	1842	1458	1200	964	833
	3	24132	18623	13027	9775	7168	1241	1005	841	686	598
	4	11779	9555	7134	5622	4330	905	742	626	514	449
	5	7087	5917	4589	3721	2950	687	566	478	394	344
	6	4762	4050	3217	2657	2145	531	437	370	303	265
	7	3414	2940	2373	1983	1619	412	339	285	233	202
	8	2548	2212	1804	1519	1249	318	260	217	175	151
	9	1946	1699	1394	1179	972	241	195	161	128	109
	10	1503	1316	1083	916	755	176	140	113	88	73
	13	642	555	446	368	292	35	23	16	10	7
20	1	2977310	1484679	589085	290528	141199	6030	4536	3604	2806	2387
	2	144257	100353	61363	41671	27686	3396	2709	2246	1821	1586
	3	43991	33974	23799	17887	13146	2364	1935	1635	1351	1189
	4	21921	17806	13326	10529	8138	1792	1488	1270	1061	939
	5	13504	11298	8793	7156	5701	1421	1190	1023	859	763
	6	9325	7954	6350	5270	4283	1158	975	841	708	630
	7	6903	5968	4850	4080	3362	960	810	700	590	525
	8	5349	4669	3843	3265	2716	803	679	586	494	439
	9	4277	3760	3124	2672	2239	675	570	492	413	367
	10	3496	3089	2584	2222	1870	568	478	411	344	304
	15	1458	1296	1090	938	786	198	158	129	100	84
	18	769	671	546	454	363	45	30	20	12	9

TABLE W (Continued)

n= 25		α									
r	k	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
25	1	7530897	3754924	1489304	734035	356277	14577	10853	8548	6586	5565
	2	378621	263067	160453	108638	71854	8286	6542	5377	4320	3740
	3	119609	92111	64194	47988	35010	5856	4744	3976	3258	2855
	4	61660	49860	37033	29039	22229	4522	3719	3153	2614	2307
	5	39267	32656	25165	20291	15978	3667	3046	2602	2173	1926
	6	28025	23729	18723	15372	12330	3068	2564	2201	1848	1643
	7	21449	18385	14744	12257	9957	2620	2200	1895	1596	1422
	8	17198	14872	12066	10120	8297	2272	1913	1651	1394	1243
	9	14251	12404	10150	8569	7072	1991	1680	1452	1226	1093
	10	12098	10581	8715	7393	6131	1759	1485	1284	1084	966
	15	6567	5808	4849	4153	3474	991	828	708	588	518
	20	4117	3632	3013	2559	2113	483	382	309	239	199
	23	2973	2587	2092	1729	1373	164	109	74	45	31

TABLE W (Continued)

n= 30		α									
r	k	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
4	1	213753	106518	42177	20728	10000	310	208	148	98	74
	2	8423	5812	3494	2324	1494	89	57	38	23	16
5	1	290480	144784	57364	28222	13647	468	327	240	168	132
	2	12220	8457	5115	3427	2230	175	123	89	61	46
	3	3027	2302	1567	1141	800	63	41	27	17	11
6	1	370276	184579	73160	36017	17439	635	452	340	245	197
	2	16146	11191	6790	4568	2990	269	197	150	108	86
	3	4264	3260	2241	1649	1176	126	90	66	45	35
	4	1727	1374	991	753	551	50	32	22	13	9
8	1	540131	269290	106782	52608	25512	993	724	557	415	341
	2	24475	16991	10344	6988	4604	476	362	286	218	181
	3	6858	5268	3654	2716	1965	272	208	164	124	102
	4	3067	2467	1814	1407	1059	158	119	92	68	55
	5	1639	1348	1019	805	616	85	62	46	32	24
	6	926	768	585	463	352	36	24	16	10	7
10	1	725803	361887	143534	70744	34336	1365	1022	797	604	503
	2	33569	23323	14224	9628	6366	705	547	441	344	291
	3	9677	7450	5189	3875	2821	436	343	279	219	186
	4	4505	3639	2697	2108	1606	286	225	182	142	120
	5	2554	2118	1623	1300	1014	188	146	117	90	75
	6	1589	1337	1044	846	667	119	90	71	52	42
	7	1026	870	683	556	438	68	49	37	26	20
	8	656	555	434	350	271	30	20	13	8	6
15	1	1283392	639964	253902	125203	60831	2564	1920	1518	1174	994
	2	60883	42342	25876	17560	11654	1396	1106	911	732	633
	3	18134	13995	9791	7348	5390	936	759	635	518	452
	4	8801	7140	5332	4203	3239	679	557	470	386	338
	5	5263	4396	3410	2766	2193	512	422	357	294	257
	6	3514	2990	2376	1963	1585	393	325	274	225	197
	7	2503	2156	1741	1455	1189	303	250	210	172	149
	8	1855	1611	1314	1107	911	233	190	159	128	110
	9	1406	1228	1008	852	703	175	141	117	93	79
	10	1077	943	776	657	542	127	101	82	63	53
	13	447	387	311	256	203	24	16	11	7	5
20	1	2059912	1027219	407592	201033	97718	4197	3161	2516	1962	1671
	2	99011	68887	42133	28621	19025	2353	1880	1561	1269	1106
	3	29954	23140	16218	12196	8971	1630	1338	1131	936	825
	4	14807	12033	9013	7126	5514	1228	1022	874	731	648
	5	9047	7574	5900	4807	3834	968	812	699	588	523
	6	6195	5288	4227	3512	2858	783	661	571	482	429
	7	4545	3933	3201	2696	2225	644	545	471	398	355
	8	3490	3049	2514	2138	1782	534	452	391	330	294
	9	2763	2432	2024	1734	1455	445	376	325	274	243
	10	2235	1978	1657	1427	1203	370	312	269	225	199
	15	872	776	654	563	473	120	96	78	61	51
	18	432	377	307	255	204	25	17	11	7	5

TABLE W (Continued)

n= 30		α									
r	k	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
25	5	15436	12933	10089	8231	6578	1708	1444	1251	1062	952
	10	4195	3724	3137	2716	2306	774	665	583	500	451
	15	1991	1793	1538	1349	1160	390	332	287	242	215
	20	1020	915	778	675	572	150	120	98	77	64
	23	578	507	415	347	279	35	24	16	10	7
30	5	41038	34168	26381	21313	16826	3974	3319	2850	2396	2135
	10	12707	11143	9216	7850	6545	1981	1690	1475	1261	1134
	15	7011	6229	5241	4522	3819	1208	1031	898	766	687
	20	4610	4107	3463	2989	2521	754	633	543	453	400
	25	3178	2815	2348	2003	1661	389	308	250	193	161
	28	2384	2081	1689	1400	1115	135	89	61	37	26

TABLE W (Continued)

n= 35		α									
r	k	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
4	1	181323	90358	35778	17583	8483	263	177	125	83	63
	2	7126	4917	2956	1966	1264	75	48	32	19	13
5	1	245675	122452	48516	23869	11542	396	276	203	142	112
	2	10308	7133	4314	2891	1881	147	103	75	51	39
	3	2546	1937	1318	960	673	53	34	23	14	10
6	1	312172	155615	61680	30365	14703	535	381	287	207	166
	2	13575	9409	5709	3841	2514	226	166	126	91	72
	3	3575	2733	1879	1383	986	106	75	55	38	29
	4	1444	1149	829	629	460	41	27	18	11	8
8	1	452209	225455	89400	44045	21359	831	606	466	348	286
	2	20433	14185	8636	5834	3844	398	303	239	182	151
	3	5709	4385	3042	2261	1635	226	173	137	103	85
	4	2545	2047	1505	1167	879	131	99	77	56	45
	5	1355	1115	843	666	510	70	51	38	26	20
	6	763	633	482	381	290	30	20	13	8	6
10	1	602822	300569	119214	58757	28519	1151	849	662	502	418
	2	27798	19314	11779	7974	5272	584	453	365	285	242
	3	7989	6151	4284	3199	2330	360	284	231	181	154
	4	3707	2995	2219	1735	1322	235	185	150	117	99
	5	2095	1737	1331	1067	832	154	120	96	74	61
	6	1299	1093	853	692	545	97	74	58	43	35
	7	836	708	556	453	356	55	40	30	21	16
	8	532	450	352	284	220	24	16	11	7	5
15	1	1038145	517674	205385	101279	49209	2076	1555	1230	952	805
	2	49080	34134	20861	14157	9396	1127	893	735	591	511
	3	14567	11243	7866	5904	4331	753	611	511	417	364
	4	7044	5715	4269	3365	2593	545	447	377	310	271
	5	4197	3505	2719	2206	1750	409	338	286	235	206
	6	2791	2375	1888	1559	1259	313	258	218	179	157
	7	1980	1706	1378	1152	941	241	198	167	136	118
	8	1461	1269	1035	872	718	183	150	125	101	87
	9	1102	963	791	669	552	137	111	92	73	62
	10	841	736	606	513	423	99	79	64	49	41
	13	343	296	238	196	156	19	12	8	5	4
20	5	6886	5766	4493	3662	2922	741	622	536	451	402
	10	1658	1468	1230	1060	894	276	233	201	168	149
	15	625	556	469	404	339	86	69	56	44	37
	18	300	262	214	178	142	18	12	8	5	3

TABLE W (Continued)

n= 35		α									
r	k	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
25	5	10857	8934	6976	5697	4559	1199	1016	882	750	673
	10	2797	2486	2098	1819	1548	527	454	399	343	310
	15	1270	1145	985	866	746	255	217	188	159	141
	20	610	547	466	405	344	91	73	60	47	39
	23	325	285	233	195	157	20	13	9	6	4
30	5	17027	14278	11155	9114	7299	1943	1651	1438	1229	1106
	10	4742	4219	3569	3101	2646	935	812	720	625	568
	15	2365	2141	1853	1639	1424	534	464	411	356	322
	20	1378	1252	1089	965	838	298	254	221	187	167
	25	783	706	604	527	449	121	97	79	62	52
	28	463	407	335	281	227	29	19	13	8	6
35	5	42503	35418	27385	22156	17524	4224	3542	3052	2578	2304
	10	13187	11585	9610	8209	6869	2154	1849	1624	1398	1264
	15	7333	6534	5523	4787	4066	1364	1177	1036	895	810
	20	4906	4391	3732	3246	2766	921	790	692	593	533
	25	3546	3172	2690	2332	1977	609	513	441	369	326
	30	2586	2297	1923	1645	1388	325	258	209	162	136
	33	1990	1740	1416	1176	939	114	76	52	32	22

TABLE W (Continued)

n= 40		α									
r	k	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
4	1	157441	78457	31065	15267	7366	228	154	109	72	54
	2	6176	4261	2562	1704	1095	65	42	28	17	12
5	1	212855	106093	42035	20681	10000	343	239	176	123	97
	2	8913	6168	3731	2500	1626	128	89	65	44	34
	3	2197	1671	1138	828	581	46	30	20	12	8
6	1	269853	134520	53318	26249	12710	463	330	248	179	143
	2	11712	8117	4925	3313	2169	195	143	109	78	62
	3	3078	2353	1618	1191	849	91	65	48	33	25
	4	1240	987	712	541	395	36	23	16	10	7
8	1	388980	193931	76900	37886	18373	715	521	401	299	246
	2	17540	12177	7413	5008	3300	341	260	205	156	130
	3	4890	3756	2605	1937	1401	194	148	117	89	73
	4	2175	1750	1287	998	751	112	84	65	48	39
	5	1156	951	719	568	434	60	43	32	22	17
	6	649	539	410	324	247	26	17	11	7	5
10	1	515674	257117	101980	50263	24396	985	727	567	430	358
	2	23729	16487	10055	6807	4500	499	387	312	244	206
	3	6805	5239	3649	2725	1984	307	242	197	154	131
	4	3150	2545	1886	1475	1123	200	157	128	100	84
	5	1776	1473	1129	904	705	131	102	82	63	52
	6	1098	924	721	585	461	82	63	49	36	29
	7	705	597	469	382	301	47	34	25	18	14
	8	448	379	296	239	185	21	14	9	6	4
15	5	3493	2918	2264	1837	1457	341	281	238	196	172
	10	689	603	497	421	347	81	64	52	41	34
	13	278	240	193	159	126	15	10	7	4	3
20	5	5580	4673	3642	2969	2369	602	506	436	367	327
	10	1321	1170	981	845	713	221	187	161	135	119
	15	487	434	366	315	265	67	54	44	34	29
	18	230	201	164	136	109	14	9	6	4	3
25	10	2126	1890	1596	1385	1179	404	348	306	263	238
	15	941	849	731	643	554	190	162	141	119	106
	20	437	392	334	291	247	65	52	43	33	28
	23	226	198	162	136	109	14	9	6	4	3
30	10	3257	2902	2459	2140	1830	658	573	508	443	403
	15	1573	1426	1237	1098	955	365	318	282	244	222
	20	878	799	696	618	539	194	166	145	123	109
	25	468	422	362	316	270	73	59	48	38	32
	28	260	229	188	158	127	16	11	7	5	3
35	10	5191	4627	3923	3417	2925	1068	934	832	728	666
	15	2657	2413	2098	1864	1628	648	570	509	447	409
	20	1627	1488	1305	1167	1026	409	358	318	277	251
	25	1050	959	840	749	656	241	206	180	153	136
	30	634	574	493	432	369	101	81	67	52	44
	33	386	340	281	236	191	25	16	11	7	5
40	10	13583	11950	9935	8505	7135	2295	1980	1745	1511	1371
	15	7585	6773	5745	4995	4260	1485	1290	1144	996	906
	20	5119	4596	3926	3431	2941	1041	904	800	695	631
	25	3766	3385	2894	2529	2166	744	641	563	484	437
	30	2879	2582	2198	1912	1626	510	431	371	311	276
	35	2180	1940	1628	1395	1163	280	222	180	140	117
	38	1707	1495	1219	1014	811	99	66	45	27	19

TABLE W (Continued)

n= 50		α									
r	k	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
4	1	124619	62101	24589	12084	5830	180	122	86	57	43
	2	4875	3364	2022	1345	865	51	33	22	13	9
5	1	167987	83730	33175	16321	7892	271	189	139	97	76
	2	7016	4855	2936	1968	1280	100	70	51	35	27
	3	1725	1312	893	650	456	36	23	16	9	7
6	1	212319	105840	41951	20653	10000	364	259	195	141	113
	2	9189	6369	3865	2600	1702	153	112	85	61	49
	3	2408	1841	1266	932	664	71	51	37	26	20
	4	968	770	555	422	308	28	18	12	7	5
8	1	304053	151590	60110	29615	14362	559	408	314	234	192
	2	13672	9491	5779	3904	2572	266	203	160	122	101
	3	3801	2920	2025	1505	1089	151	115	91	69	57
	4	1686	1356	997	773	582	87	65	51	37	30
	5	893	735	556	439	336	46	34	25	17	13
	6	500	415	316	250	190	20	13	9	5	4
10	1	400209	199546	79146	39009	18934	764	564	440	334	278
	2	18362	12758	7781	5268	3483	386	300	242	189	160
	3	5250	4042	2815	2102	1531	237	187	152	119	101
	4	2423	1957	1451	1134	864	154	121	98	77	65
	5	1361	1129	865	693	541	100	78	63	48	40
	6	839	706	551	447	352	63	48	37	28	22
	7	537	455	357	291	229	35	26	19	13	10
	8	340	288	225	181	141	16	10	7	4	3
15	5	2619	2188	1698	1377	1093	256	211	179	147	129
	6	1731	1473	1171	968	782	195	161	136	112	97
	7	1220	1051	849	710	580	149	122	103	84	73
	8	894	777	634	534	439	113	92	77	62	54
	9	670	585	481	406	336	84	68	56	44	38
	10	507	444	366	309	255	60	47	39	30	25
	13	202	175	140	116	92	11	7	5	3	2
20	5	4061	3401	2651	2161	1725	439	369	318	269	237
	6	2748	2347	1877	1561	1272	351	297	257	217	193
	7	1992	1725	1405	1184	978	285	242	209	177	158
	8	1511	1321	1090	928	774	234	198	172	145	129
	9	1181	1040	866	743	624	192	163	141	119	105
	10	942	834	700	603	509	158	133	115	96	85
	15	339	302	254	219	184	47	37	31	24	20
	18	157	137	112	93	74	9	6	4	3	2
25	10	1449	1288	1089	945	805	277	239	210	181	163
	15	624	563	485	427	368	127	108	94	79	70
	20	279	251	214	186	158	42	34	27	21	18
	23	141	123	101	84	68	9	6	4	2	2
30	15	966	877	762	676	589	227	198	176	153	138
	20	518	472	412	366	319	116	99	87	73	65
	25	261	236	202	177	151	41	33	27	21	18
	28	139	122	101	84	68	9	6	4	2	2
35	15	1406	1280	1117	995	872	356	314	282	248	227
	20	819	751	661	593	523	214	188	167	146	133
	25	495	453	399	356	313	117	101	88	75	67
	30	271	246	212	186	159	44	35	29	23	19
	33	151	133	110	92	75	10	6	4	3	2

G TABLE K: Future Sample Quantiles for the One-Parameter Exponential Distribution

Explanation of the Tables

Table K gives the quantiles, $c_{1-\alpha} \times 10^4$, at various α levels of significance, for the s^{th} observation from a One-Parameter Exponential random sample of size m based on a preliminary test which has been terminated at the time of the k^{th} failure. Note that k can take on any value up to and including the size of the preliminary sample. That is,

$$Pr[kY_s/T_k \geq c_{1-\alpha}] = 1 - \alpha$$

where Y_s is the time to failure of the s^{th} failed unit in the second sample, $X_1, X_2, \ldots, X_n$ are the ordered failure times for the first sample, and

$$T_k = \sum_{i=1}^{k} X_i + (n-k)X_k \ .$$

NOTE: The values given in these tables must be divided by 10^4 in order to obtain the proper quantile.

TABLE K: Future Sample Quantiles for the One-Parameter Exponential Distribution

k= 5		α									
m	s	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
5	2	213	308	506	750	1142	11738	15686	20169	27082	33193
	3	749	976	1409	1898	2629	19356	25377	32193	42679	51938
	4	1694	2105	2860	3685	4884	30840	40097	50572	66685	80910
10	2	101	145	238	354	538	5502	7346	9440	12666	15517
	3	327	425	613	825	1141	8277	10828	13711	18142	22052
	4	659	818	1108	1423	1878	11404	14749	18523	24316	29423
	5	1091	1316	1719	2147	2757	15036	19308	24122	31507	38015
	9	4403	5088	6282	7527	9272	43519	55413	68829	89419	107572
15	2	66	95	156	231	352	3598	4804	6172	8281	10145
	3	209	273	393	529	731	5292	6921	8762	11591	14086
	4	413	512	693	889	1173	7097	9173	11515	15110	18278
	5	663	799	1043	1302	1671	9050	11610	14495	18920	22817
	10	2628	3007	3661	4336	5271	22888	28909	35682	46056	55190
	14	6181	7006	8432	9904	11950	51162	64677	79904	103257	123834

k= 6		α									
m	s	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
5	2	216	311	511	757	1150	11175	14701	18608	24461	29494
	3	765	996	1434	1926	2657	18344	23650	29504	38252	45762
	4	1740	2159	2924	3753	4951	29153	37253	46187	59537	70997
10	2	102	147	241	357	541	5237	6884	8707	11437	13783
	3	334	434	624	838	1154	7842	10085	12555	16242	19404
	4	678	839	1133	1450	1905	10770	13681	16881	21647	25730
	5	1126	1356	1764	2195	2803	14168	17859	21909	27937	33099
	9	4590	5286	6492	7738	9466	40860	51043	62227	78891	93169
15	2	67	96	158	233	354	3425	4502	5693	7477	9010
	3	214	278	400	537	739	5014	6446	8023	10376	12393
	4	424	525	709	906	1190	6701	8508	10492	13447	15978
	5	684	824	1071	1332	1699	8526	10736	13160	16767	19854
	10	2747	3133	3793	4467	5392	21436	26533	32112	40400	47487
	14	6480	7317	8751	10217	12233	47904	59365	71937	90647	106667

k= 7		α									
m	s	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
5	2	218	314	515	762	1155	10791	14041	17576	22787	27141
	3	778	1011	1453	1947	2679	17654	22491	27729	35396	41846
	4	1776	2200	2972	3806	5002	28001	35345	43296	54932	64722
10	2	103	148	243	359	544	5057	6574	8223	10642	12679
	3	339	440	632	847	1163	7545	9586	11793	15016	17724
	4	692	856	1152	1471	1925	10336	12964	15797	19926	23390
	5	1154	1386	1799	2231	2838	13573	16884	20447	25636	29986
	9	4739	5443	6657	7902	9617	39035	48100	57868	72113	84068
15	2	67	97	159	235	356	3307	4299	5376	6957	8288
	3	217	282	405	543	745	4824	6127	7535	9591	11318
	4	433	535	721	919	1203	6431	8061	9817	12375	14521
	5	701	842	1092	1354	1721	8166	10148	12278	15379	17977
	10	2843	3233	3897	4571	5487	20435	24929	29749	36750	42610
	14	6721	7566	9005	10465	12457	45661	55781	66668	82523	95817

TABLE K (Continued)

k= 8		α									
m	s	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
5	2	220	316	518	766	1159	10512	13567	16845	21584	25518
	3	787	1022	1467	1964	2696	17152	21660	26473	33407	39151
	4	1804	2233	3011	3847	5042	27163	33976	41249	51728	60411
10	2	103	149	244	361	546	4926	6352	7880	10087	11918
	3	343	445	639	854	1171	7329	9229	11253	14162	16568
	4	703	868	1167	1487	1941	10021	12450	15029	18727	21781
	5	1176	1411	1826	2261	2866	13140	16184	19412	24033	27846
	9	4860	5571	6791	8035	9738	37703	45985	54779	67397	77823
15	2	68	98	160	236	357	3222	4153	5152	6594	7790
	3	220	286	409	547	750	4686	5898	7189	9045	10579
	4	440	543	730	930	1213	6234	7740	9338	11628	13519
	5	715	857	1109	1372	1738	7905	9725	11653	14412	16687
	10	2921	3315	3982	4655	5564	19703	23773	28070	34205	39257
	14	6920	7771	9213	10667	12638	44019	53200	62929	76867	88369

k= 9		α									
m	s	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
5	2	221	318	521	769	1162	10301	13211	16301	20713	24334
	3	795	1031	1479	1977	2709	16772	21035	25538	31944	37187
	4	1827	2259	3041	3880	5075	26527	32947	39726	49374	57273
10	2	104	150	245	362	547	4827	6185	7624	9678	11362
	3	346	449	644	860	1177	7165	8960	10851	13534	15726
	4	712	879	1180	1500	1954	9781	12063	14457	17846	20609
	5	1194	1431	1849	2284	2889	12811	15658	18640	22855	26288
	9	4960	5677	6901	8145	9838	36687	44390	52477	63933	73283
15	2	68	98	161	237	358	3157	4044	4985	6327	7427
	3	222	288	413	551	754	4581	5726	6932	8643	10040
	4	445	550	738	938	1221	6085	7499	8981	11079	12789
	5	725	869	1123	1386	1752	7706	9407	11187	13701	15747
	10	2986	3383	4053	4724	5627	19144	22899	26815	32331	36814
	14	7088	7943	9387	10835	12788	42765	51251	60139	72708	82954

k= 10		α									
m	s	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
5	2	222	319	523	771	1165	10135	12934	15880	20046	23432
	3	801	1039	1488	1988	2720	16473	20548	24814	30824	35695
	4	1846	2281	3067	3908	5102	26027	32145	38549	47572	54891
10	2	105	150	246	363	549	4749	6054	7427	9365	10939
	3	349	453	648	865	1182	7037	8751	10540	13053	15085
	4	719	887	1190	1511	1965	9593	11761	14014	17171	19719
	5	1208	1448	1868	2304	2908	12552	15247	18043	21952	25105
	9	5045	5766	6994	8236	9921	35887	43146	50696	61283	69839
15	2	68	98	161	238	359	3106	3959	4856	6122	7150
	3	224	290	415	554	757	4499	5592	6733	8335	9630
	4	450	555	744	945	1228	5968	7311	8706	10658	12234
	5	735	880	1134	1398	1763	7549	9159	10826	13156	15033
	10	3041	3441	4112	4783	5681	18703	22216	25843	30895	34957
	14	7231	8090	9534	10978	12915	41775	49727	57978	69525	78844

TABLE K (Continued)

k= 12		α									
m	s	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
5	2	223	321	526	775	1169	9892	12530	15271	19091	22152
	3	811	1051	1503	2005	2737	16035	19840	23770	29223	33580
	4	1875	2315	3106	3950	5143	25293	30978	36849	45001	51519
10	2	105	151	248	365	550	4635	5865	7141	8917	10339
	3	353	458	655	872	1189	6848	8446	10090	12365	14177
	4	731	901	1205	1528	1982	9316	11321	13375	16206	18457
	5	1232	1474	1897	2334	2937	12170	14647	17179	20663	23428
	9	5181	5909	7142	8382	10053	34706	41328	48121	57499	64968
15	2	69	99	162	239	360	3031	3835	4669	5829	6757
	3	227	294	420	559	762	4378	5397	6446	7895	9049
	4	457	564	754	955	1238	5795	7036	8307	10057	11448
	5	749	896	1152	1417	1781	7319	8797	10305	12378	14022
	10	3130	3533	4208	4877	5766	18049	21215	24432	28838	32323
	14	7462	8327	9771	11206	13117	40310	47497	54849	64977	73029

k= 15		α									
m	s	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
5	2	225	323	529	779	1173	9656	12140	14689	18189	20953
	3	821	1063	1519	2022	2755	15607	19156	22772	27713	31604
	4	1906	2350	3148	3995	5186	24577	29851	35226	42578	48373
10	2	106	152	249	367	552	4524	5682	6868	8494	9776
	3	358	463	661	880	1197	6664	8151	9661	11716	13328
	4	743	915	1222	1546	1999	9046	10896	12764	15296	17278
	5	1257	1501	1928	2367	2968	11797	14067	16353	19446	21862
	9	5329	6063	7301	8538	10194	33547	39567	45656	53935	60432
15	2	69	100	163	240	362	2959	3715	4490	5552	6389
	3	229	297	424	564	767	4260	5209	6171	7479	8506
	4	465	572	764	967	1249	5627	6771	7926	9490	10713
	5	764	912	1171	1436	1800	7094	8446	9806	11643	13076
	10	3228	3634	4311	4978	5857	17405	20241	23076	26891	29860
	14	7718	8587	10031	11454	13336	38865	45329	51847	60687	67610

k= 20		α									
m	s	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
5	2	226	325	532	783	1177	9425	11764	14132	17336	19830
	3	831	1076	1534	2040	2773	15190	18495	21817	26289	29757
	4	1939	2387	3191	4041	5232	23877	28762	33674	40295	45439
10	2	107	153	251	369	554	4416	5505	6606	8093	9249
	3	362	469	668	888	1205	6484	7867	9250	11103	12534
	4	756	929	1239	1564	2017	8782	10485	12179	14437	16177
	5	1283	1531	1960	2401	3001	11432	13506	15562	18297	20400
	9	5490	6231	7474	8707	10346	32408	37859	43297	50577	56208
15	2	70	100	164	241	363	2888	3600	4319	5290	6044
	3	232	301	428	569	772	4145	5027	5908	7087	7998
	4	473	582	775	978	1261	5462	6515	7561	8954	10026
	5	780	930	1191	1457	1820	6873	8107	9328	10949	12193
	10	3335	3745	4424	5088	5956	16769	19291	21771	25047	27553
	14	8004	8877	10318	11727	13575	37439	43220	48967	56640	62562
20	2	52	75	122	179	270	2146	2675	3209	3930	4491
	3	171	221	315	419	568	3049	3697	4344	5210	5879
	4	345	424	564	712	918	3971	4735	5494	6505	7282
	5	561	669	857	1048	1309	4931	5814	6687	7845	8734
	10	2189	2456	2896	3326	3887	10777	12368	13928	15984	17553
	15	5026	5531	6355	7150	8179	20512	23336	26105	29754	32539
	19	9881	10837	12405	13929	15916	41040	47059	53030	60990	67124

TABLE K (Continued)

k= 25		α									
m	s	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
5	2	227	327	534	785	1180	9289	11545	13810	16847	19191
	3	837	1083	1544	2051	2784	14945	18110	21265	25473	28708
	4	1959	2411	3218	4070	5260	23465	28127	32777	38989	43775
10	2	107	154	252	370	556	4352	5402	6455	7864	8949
	3	365	472	673	893	1210	6379	7701	9012	10752	12083
	4	764	939	1250	1576	2028	8626	10245	11840	13945	15551
	5	1300	1549	1981	2422	3021	11217	13177	15103	17638	19568
	9	5594	6340	7584	8815	10442	31733	36859	41929	48657	53815
15	2	70	101	165	242	364	2846	3532	4220	5140	5848
	3	234	303	431	572	775	4078	4921	5756	6862	7709
	4	478	587	782	985	1268	5365	6365	7350	8647	9636
	5	790	941	1203	1470	1832	6742	7908	9050	10551	11691
	10	3404	3817	4497	5159	6020	16391	18732	21010	23987	26239
	14	8192	9067	10505	11904	13730	36591	41981	47294	54324	59702
20	2	52	75	122	180	270	2115	2625	3136	3819	4345
	3	172	223	317	421	571	2999	3619	4232	5045	5667
	4	348	428	569	718	923	3900	4626	5340	6281	6998
	5	569	678	866	1058	1318	4837	5671	6487	7559	8373
	10	2235	2503	2945	3374	3930	10531	12004	13433	15294	16699
	15	5154	5661	6483	7271	8284	20006	22598	25113	28387	30860
	19	10142	11097	12657	14164	16118	40061	45640	51129	58378	63915
25	2	42	60	97	143	215	1683	2089	2495	3038	3457
	3	136	176	251	333	452	2372	2862	3347	3990	4481
	4	274	336	448	564	726	3066	3636	4196	4935	5497
	5	444	529	677	826	1030	3775	4425	5061	5896	6530
	10	1672	1872	2201	2520	2934	7823	8910	9963	11334	12368
	15	3547	3891	4446	4977	5658	13402	15093	16727	18850	20448
	20	6589	7160	8081	8959	10080	22804	25588	28284	31789	34431
	24	11689	12703	14352	15939	17988	42767	48496	54123	61546	67210

TABLE K (Continued)

k= 30		α									
m	s	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
5	2	228	328	535	787	1181	9200	11401	13600	16530	18779
	3	842	1089	1551	2059	2792	14783	17858	20905	24944	28031
	4	1973	2427	3237	4090	5279	23193	27710	32192	38144	42703
10	2	107	154	252	371	556	4310	5335	6356	7715	8756
	3	367	475	675	896	1213	6309	7592	8857	10524	11792
	4	770	945	1257	1584	2036	8524	10087	11619	13626	15147
	5	1311	1562	1995	2437	3035	11074	12962	14804	17212	19032
	9	5667	6415	7662	8890	10509	31287	36202	41038	47416	52277
15	2	70	101	165	243	364	2819	3488	4155	5042	5721
	3	235	304	433	574	778	4033	4851	5656	6717	7523
	4	482	591	786	990	1273	5301	6267	7212	8448	9384
	5	797	949	1212	1479	1841	6656	7778	8869	10293	11367
	10	3453	3868	4549	5209	6065	16140	18363	20512	23298	25391
	14	8326	9202	10637	12029	13838	36028	41165	46201	52825	57863
20	2	52	75	123	180	271	2095	2592	3088	3746	4251
	3	173	224	319	423	572	2966	3567	4159	4938	5529
	4	351	431	573	721	927	3854	4555	5240	6136	6815
	5	574	683	872	1064	1324	4776	5577	6357	7374	8140
	10	2267	2537	2979	3407	3959	10367	11763	13108	14846	16147
	15	5246	5753	6573	7356	8359	19669	22110	24460	27497	29773
	19	10329	11263	12836	14330	16260	39409	44705	49885	56685	61851
25	2	42	60	98	144	215	1667	2062	2457	2981	3382
	3	137	177	252	334	453	2347	2822	3289	3905	4373
	4	276	339	450	567	729	3029	3579	4117	4821	5353
	5	448	534	681	832	1034	3727	4352	4960	5751	6348
	10	1696	1897	2227	2545	2956	7701	8730	9721	11000	11957
	15	3611	3955	4509	5037	5710	13171	14759	16282	18242	19707
	20	6721	7292	8208	9077	10182	22396	25002	27506	30735	33151
	24	11922	12933	14570	16140	18160	42045	47464	52758	59698	64964
30	2	35	50	81	119	179	1384	1713	2040	2475	2808
	3	113	147	209	277	375	1941	2334	2721	3230	3617
	4	227	279	371	467	601	2495	2949	3392	3971	4409
	5	368	438	559	682	849	3057	3569	4067	4716	5205
	10	1357	1518	1781	2035	2363	6141	6959	7746	8761	9521
	15	2775	3037	3460	3863	4376	10023	11219	12364	13838	14938
	20	4780	5178	5814	6415	7177	15444	17182	18845	20983	22578
	25	7961	8580	9569	10504	11690	24624	27364	29993	33379	35911
	29	13240	14295	16000	17829	19720	44206	49729	55117	62173	67523

TABLE K (Continued)

k= 35		ν α									
m	s	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
5	2	229	328	536	788	1183	9137	11300	13452	16308	18490
	3	845	1092	1556	2064	2798	14669	17680	20652	24574	27559
	4	1983	2438	3250	4104	5293	23001	27416	31781	37553	41956
10	2	108	155	253	371	557	4281	5287	6287	7611	8620
	3	368	476	678	898	1216	6260	7516	8748	10365	11589
	4	773	950	1262	1589	2042	8451	9976	11463	13403	14866
	5	1320	1571	2005	2448	3045	10973	12809	14593	16913	18658
	9	5721	6471	7719	8945	10559	30969	35738	40410	46547	51206
15	2	71	101	165	243	365	2800	3457	4110	4974	5633
	3	236	305	434	576	779	4002	4802	5586	6615	7393
	4	484	594	790	994	1276	5255	6197	7115	8309	9209
	5	802	955	1218	1486	1847	6595	7686	8742	10112	11141
	10	3490	3905	4587	5246	6098	15961	18102	20161	22815	24799
	14	8426	9302	10735	12121	13918	35627	40588	45432	51776	56583
20	2	52	75	123	181	271	2080	2569	3054	3696	4185
	3	174	225	320	424	574	2943	3531	4108	4863	5434
	4	353	433	575	724	929	3821	4504	5169	6035	6687
	5	577	687	876	1069	1329	4732	5511	6266	7244	7978
	10	2291	2562	3004	3431	3981	10251	11593	12879	14531	15761
	15	5315	5822	6640	7420	8415	19427	21763	23999	26872	29013
	19	10470	11423	12970	14454	16366	38944	44042	49008	55501	60413
25	2	42	60	98	144	216	1655	2044	2430	2940	3329
	3	138	178	253	335	454	2328	2793	3249	3846	4297
	4	277	340	452	569	731	3003	3540	4062	4741	5253
	5	451	537	685	835	1038	3693	4300	4888	5650	6221
	10	1714	1916	2246	2563	2973	7614	8603	9550	10764	11668
	15	3659	4003	4557	5082	5750	13006	14521	15966	17815	19188
	20	6821	7391	8303	9165	10259	22103	24584	26954	29993	32254
	24	12099	13107	14735	16292	18288	41528	46732	51794	58404	63400
30	2	35	50	81	119	179	1375	1697	2018	2442	2765
	3	114	147	209	277	376	1926	2310	2687	3181	3554
	4	229	281	373	469	602	2474	2916	3346	3906	4327
	5	370	441	562	685	852	3029	3527	4009	4633	5101
	10	1371	1533	1796	2049	2376	6071	6857	7609	8574	9291
	15	2812	3075	3497	3897	4406	9896	11036	12122	13510	14540
	20	4853	5250	5883	6480	7233	15237	16886	18455	20459	21945
	25	8090	8706	9689	10615	11784	24287	26886	29364	32539	34898
	29	13449	14499	16191	17804	19867	43646	48938	54080	60787	65852
35	2	30	43	69	102	153	1175	1451	1725	2087	2364
	3	97	126	179	237	320	1642	1970	2291	2712	3030
	4	194	239	317	399	512	2104	2479	2845	3321	3678
	5	314	374	477	581	722	2568	2990	3398	3927	4324
	10	1143	1278	1497	1708	1980	5054	5707	6331	7132	7727
	15	2289	2502	2845	3170	3582	8018	8937	9812	10929	11758
	20	3804	4112	4604	5067	5650	11804	13065	14263	15791	16922

TABLE K (Continued)

k= 40		α									
m	s	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
5	2	229	329	537	789	1184	9090	11224	13342	16144	18278
	3	847	1095	1559	2068	2802	14583	17547	20464	24300	27211
	4	1991	2447	3260	4115	5303	22857	27198	31476	37116	41405
10	2	108	155	253	372	558	4259	5252	6235	7534	8520
	3	370	478	679	900	1218	6223	7459	8667	10247	11439
	4	777	953	1266	1594	2046	8397	9893	11347	13238	14658
	5	1326	1578	2013	2456	3053	10898	12696	14436	16692	18382
	9	5763	6514	7762	8988	10596	30732	35392	39944	45905	50417
15	2	71	101	166	243	365	2785	3434	4076	4924	5568
	3	237	306	435	577	780	3978	4765	5535	6539	7297
	4	486	596	792	997	1279	5222	6146	7043	8206	9079
	5	806	959	1223	1491	1852	6550	7617	8647	9978	10974
	10	3518	3934	4616	5274	6123	15827	17907	19899	22457	24361
	14	8503	9380	10811	12193	13980	35326	40157	44860	51001	55640
20	2	53	75	123	181	271	2070	2552	3029	3658	4136
	3	174	225	320	425	574	2926	3504	4069	4807	5363
	4	354	434	577	726	931	3796	4467	5117	5960	6592
	5	580	690	880	1073	1332	4699	5462	6198	7148	7858
	10	2310	2581	3024	3450	3998	10163	11466	12708	14297	15476
	15	5368	5876	6693	7469	8458	19246	21503	23655	26408	28451
	19	10580	11532	13074	14551	16448	38596	43546	48356	54625	59354
25	2	42	60	98	144	216	1647	2030	2410	2911	3291
	3	138	178	254	336	455	2314	2772	3219	3802	4241
	4	278	342	454	571	732	2984	3510	4021	4683	5179
	5	453	539	688	838	1041	3667	4262	4835	5575	6128
	10	1728	1930	2260	2577	2985	7549	8508	9422	10590	11456
	15	3697	4041	4593	5116	5780	12882	14343	15730	17497	18804
	20	6900	7469	8377	9234	10318	21883	24270	26542	29442	31590
	24	12238	13243	14864	16409	18387	41140	46184	51078	57447	62247
30	2	35	50	81	120	179	1368	1686	2001	2417	2733
	3	114	148	210	278	376	1915	2293	2662	3145	3508
	4	229	282	374	470	604	2458	2892	3312	3857	4265
	5	372	443	564	688	854	3008	3495	3965	4571	5024
	10	1383	1544	1807	2061	2386	6019	6782	7507	8434	9121
	15	2841	3104	3525	3924	4429	9801	10900	11942	13267	14245
	20	4910	5306	5937	6530	7277	15081	16664	18163	20069	21475
	25	8192	8806	9784	10702	11859	24033	26527	28895	31914	34148
	29	13613	14659	16341	17941	19982	43226	48347	53309	59761	64621
35	2	30	43	70	102	153	1169	1441	1711	2066	2336
	3	97	126	179	237	321	1633	1955	2270	2681	2991
	4	195	239	318	400	513	2090	2459	2816	3279	3626
	5	316	376	479	583	724	2550	2963	3361	3875	4259
	10	1153	1287	1507	1718	1989	5010	5644	6246	7016	7586
	15	2313	2526	2868	3192	3601	7941	8826	9665	10731	11518
	30	9304	9955	10988	11956	13171	25852	28434	30884	34004	36311
	34	14786	15865	17598	19242	21335	44993	50180	55201	61725	66635
40	2	26	37	61	89	134	1021	1259	1494	1805	2040
	3	85	110	156	207	280	1423	1704	1979	2337	2607
	4	170	208	277	348	447	1818	2139	2449	2852	3154
	5	274	326	416	506	629	2213	2572	2917	3363	3696
	10	989	1104	1292	1473	1708	4293	4835	5351	6009	6497
	15	1952	2132	2420	2693	3037	6685	7428	8132	9027	9686
	30	6917	7383	8123	8816	9682	18531	20301	21973	24093	25654
	35	10277	10959	12038	13048	14313	27428	30087	32608	35816	38186
	39	15806	16914	18690	20372	22510	46528	51773	56846	63432	68386

TABLE K (Continued)

k= 50		α									
m	s	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
5	2	229	329	538	790	1185	9025	11120	13190	15917	17985
	3	851	1100	1564	2074	2808	14465	17363	20204	23923	26732
	4	2001	2459	3275	4130	5318	22657	26895	31054	36513	40648
10	2	108	155	253	372	558	4228	5203	6164	7427	8383
	3	371	479	681	903	1220	6172	7379	8555	10084	11232
	4	781	958	1272	1600	2052	8321	9778	11188	13010	14372
	5	1335	1588	2024	2467	3064	10793	12538	14220	16387	18003
	9	5822	6576	7825	9048	10650	30401	34911	39300	45021	49333
15	2	71	102	166	244	365	2765	3402	4030	4854	5478
	3	238	307	437	579	782	3945	4715	5463	6435	7165
	4	489	599	796	1000	1283	5174	6074	6943	8064	8901
	5	812	965	1230	1498	1859	6486	7522	8516	9794	10744
	10	3559	3976	4658	5314	6159	15639	17635	19536	21962	23759
	14	8616	9493	10921	12296	14069	34907	39558	44069	49933	54345
20	2	53	76	123	181	272	2055	2528	2994	3606	4070
	3	175	226	322	426	576	2902	3467	4017	4731	5266
	4	356	437	580	729	934	3762	4414	5044	5857	6463
	5	584	695	885	1078	1337	4653	5393	6103	7015	7693
	10	2337	2609	3052	3477	4022	10041	11288	12471	13974	15083
	15	5446	5954	6769	7541	8520	18992	21140	23176	25765	27676
	19	10741	11691	13225	14691	16567	38108	42857	47453	53418	57900
25	2	42	60	98	144	216	1635	2011	2382	2869	3238
	3	139	179	254	337	455	2295	2742	3177	3741	4164
	4	280	343	456	573	735	2957	3469	3964	4601	5077
	5	457	543	691	842	1045	3632	4208	4761	5471	5999
	10	1748	1951	2281	2598	3004	7457	8376	9245	10349	11162
	15	3752	4096	4647	5167	5824	12708	14095	15402	17057	18273
	20	7015	7582	8486	9335	10404	21573	23832	25968	28677	30674
30	2	35	50	82	120	179	1358	1670	1978	2383	2688
	3	115	148	211	279	377	1899	2268	2628	3094	3444
	4	231	283	376	472	605	2436	2858	3265	3790	4181
	5	375	446	568	691	857	2979	3451	3905	4486	4919
	10	1399	1561	1824	2077	2401	5946	6676	7366	8242	8886
	15	2883	3146	3567	3963	4463	9668	10709	11690	12929	13838
	20	4994	5389	6016	6604	7340	14861	16353	17756	19527	20826
35	2	30	43	70	102	153	1161	1428	1691	2037	2298
	3	98	126	180	238	321	1619	1934	2241	2638	2937
	4	196	241	320	402	515	2071	2430	2776	3222	3555
	5	318	378	481	586	727	2525	2926	3310	3803	4169
	10	1166	1301	1521	1731	2001	4949	5555	6129	6855	7390
	15	2347	2561	2902	3223	3629	7832	8671	9460	10457	11187
	20	3915	4222	4709	5165	5734	11510	12647	13716	15061	16047
40	2	26	37	61	89	134	1014	1247	1477	1779	2007
	3	85	110	157	207	280	1411	1686	1953	2300	2560
	4	171	209	278	349	448	1802	2114	2415	2803	3092
	5	276	328	418	509	631	2192	2539	2873	3300	3618
	10	1000	1116	1304	1485	1716	4241	4759	5250	5872	6329
45	2	23	33	54	79	119	900	1107	1311	1579	1782
	3	76	98	139	184	248	1251	1494	1731	2038	2268
	4	151	185	246	309	396	1594	1870	2137	2480	2736
	5	244	290	369	450	558	1936	2243	2538	2915	3196
	10	876	977	1142	1300	1502	3711	4164	4593	5136	5536

TABLE K (Continued)

k= 50		α									
m	s	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
50	2	21	30	49	71	107	809	995	1179	1419	1602
	3	68	88	125	165	223	1123	1342	1554	1830	2037
	4	136	166	221	277	355	1430	1677	1916	2224	2453
	5	218	260	331	403	499	1734	2009	2273	2611	2862
	10	779	869	1016	1156	1336	3299	3702	4083	4566	4921

TABLE K (Continued)

k= 60		α									
m	s	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
5	2	230	330	538	791	1186	8981	11051	13090	15768	17793
	3	853	1102	1568	2078	2812	14386	17242	20033	23675	26418
	4	2009	2468	3285	4141	5328	22525	26694	30776	36118	40152
10	2	108	156	254	373	559	4208	5170	6117	7357	8293
	3	372	481	683	904	1222	6138	7327	8481	9977	11097
	4	784	961	1276	1604	2056	8271	9702	11082	12860	14185
	5	1341	1595	2032	2475	3072	10723	12434	14077	16186	17754
	9	5863	6618	7868	9090	10687	30182	34593	38875	44440	48624
15	2	71	102	166	244	366	2752	3381	3999	4808	5419
	3	238	308	438	580	783	3924	4681	5416	6367	7078
	4	490	601	798	1003	1285	5143	6027	6877	7970	8784
	5	815	969	1234	1503	1863	6444	7459	8429	9672	10594
	10	3586	4005	4687	5342	6184	15514	17455	19296	21637	23363
	14	8694	9571	10997	12367	14130	34627	39161	43546	49232	53498
20	2	53	76	123	181	272	2045	2512	2971	3572	4026
	3	176	227	322	427	576	2886	3442	3982	4680	5202
	4	357	438	581	730	936	3739	4380	4996	5789	6378
	5	587	698	888	1081	1340	4623	5348	6041	6928	7585
	10	2356	2628	3071	3495	4039	9959	11170	12314	13762	14825
25	2	42	60	98	144	216	1627	1999	2364	2842	3203
	3	139	179	255	338	456	2283	2723	3149	3701	4114
	4	281	345	457	575	736	2939	3442	3926	4548	5010
	5	459	545	694	845	1047	3608	4173	4713	5403	5914
	10	1762	1965	2296	2612	3016	7396	8288	9128	10190	10969
30	2	35	50	82	120	180	1351	1660	1963	2360	2659
	3	115	149	211	279	377	1888	2252	2605	3061	3403
	4	232	284	377	474	607	2421	2836	3234	3746	4126
	5	376	448	570	693	859	2959	3422	3865	4431	4849
	10	1410	1572	1836	2088	2411	5897	6605	7272	8115	8732
35	2	30	43	70	102	154	1155	1419	1678	2018	2274
	3	98	127	180	238	322	1610	1921	2221	2610	2901
	4	197	242	321	403	516	2059	2411	2750	3185	3508
	5	319	380	483	588	729	2509	2901	3276	3755	4110
	10	1176	1311	1531	1741	2009	4909	5497	6050	6750	7262
40	2	26	37	61	89	134	1009	1239	1466	1762	1986
	3	85	110	157	208	281	1404	1674	1936	2275	2529
	4	171	210	279	350	449	1791	2097	2392	2770	3051
	5	277	330	419	510	633	2178	2518	2843	3259	3587
	10	1008	1124	1313	1493	1723	4206	4709	5183	5781	6219
45	2	23	33	54	79	119	896	1100	1301	1564	1762
	3	76	98	139	184	249	1244	1484	1716	2016	2241
	4	152	186	247	310	397	1585	1856	2116	2451	2700
	5	245	291	371	451	559	1924	2224	2512	2879	3151
	10	883	985	1149	1307	1509	3680	4120	4534	5057	5440
50	2	21	30	49	71	107	805	989	1170	1406	1584
	3	68	88	125	165	223	1117	1332	1541	1810	2012
	4	136	167	221	278	356	1421	1664	1898	2198	2421
	5	219	261	332	404	501	1723	1992	2249	2578	2822
	10	785	876	1022	1162	1342	3272	3663	4031	4495	4835
55	2	19	27	44	65	97	731	898	1062	1277	1439
	3	62	80	113	150	203	1013	1209	1398	1643	1826
	4	123	151	201	252	323	1288	1508	1720	1992	2194
	5	199	236	301	366	453	1560	1804	2037	2335	2555
	10	707	789	921	1047	1208	2946	3297	3628	4046	4352

TABLE K (Continued)

k= 60		α									
m	s	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
60	2	17	25	40	59	89	670	823	973	1170	1318
	3	56	73	104	137	185	928	1106	1279	1503	1671
	4	113	138	183	231	295	1178	1379	1573	1822	2007
	5	182	216	275	334	414	1425	1648	1861	2133	2334
	10	643	717	837	952	1099	2679	2998	3299	3679	3957

TABLE K (Continued)

k= 80		α									
m	s	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
5	2	230	331	539	792	1187	8928	10965	12966	15584	17556
	3	856	1106	1572	2083	2817	14288	17091	19820	23369	26031
	4	2018	2478	3297	4154	5341	22360	26446	30432	35630	39542
10	2	108	156	254	373	559	4182	5130	6059	7271	8182
	3	373	482	685	906	1224	6096	7262	8390	9846	10931
	4	787	965	1281	1609	2061	8209	9608	10952	12675	13954
	5	1349	1604	2042	2485	3081	10636	12305	13900	15939	17448
	9	5916	6673	7923	9143	10734	29908	34198	38349	43725	47753
15	2	71	102	166	244	366	2735	3354	3961	4752	5346
	3	239	309	439	581	785	3897	4639	5357	6282	6971
	4	493	604	801	1006	1288	5104	5968	6796	7855	8640
	5	820	975	1240	1509	1869	6392	7380	8322	9523	10408
	10	3622	4042	4724	5378	6216	15358	17230	18998	21234	22876
	14	8795	9672	11095	12458	14208	34278	38667	42899	48367	52457
20	2	53	76	124	182	272	2033	2493	2943	3530	3972
	3	176	228	323	428	578	2866	3412	3939	4618	5124
	4	359	440	584	733	938	3711	4337	4937	5705	6273
	5	590	701	892	1085	1344	4585	5292	5964	6820	7452
	10	2379	2652	3095	3519	4060	9857	11024	12119	13499	14506
	15	5571	6079	6890	7654	8618	18609	20597	22464	24817	26538
25	2	42	60	98	145	216	1617	1983	2342	2809	3160
	3	139	180	256	338	457	2267	2699	3115	3652	4052
	4	282	346	459	576	738	2916	3408	3879	4482	4927
	5	461	548	697	848	1050	3578	4129	4653	5319	5810
	10	1780	1984	2314	2630	3032	7320	8178	8983	9994	10731
	15	3839	4183	4732	5247	5893	12446	13722	14913	16406	17491
30	2	35	50	82	120	180	1343	1647	1944	2332	2624
	3	115	149	212	280	378	1875	2232	2577	3021	3351
	4	233	285	378	475	608	2403	2808	3196	3691	4058
	5	379	450	572	696	862	2935	3386	3816	4362	4764
	10	1424	1587	1851	2103	2424	5837	6518	7156	7957	8542
	15	2951	3214	3632	4025	4517	9466	10423	11315	12429	13238
35	2	30	43	70	103	154	1148	1408	1662	1994	2243
	3	98	127	180	239	322	1599	1903	2197	2576	2857
	4	198	243	322	404	517	2043	2387	2717	3139	3450
	5	321	382	485	590	731	2488	2871	3234	3697	4038
	10	1188	1323	1543	1753	2020	4858	5424	5953	6619	7103
	15	2403	2616	2956	3274	3673	7668	8438	9155	10050	10699
40	2	26	37	61	90	134	1003	1230	1452	1742	1959
	3	86	111	157	208	281	1394	1659	1915	2245	2490
	4	172	211	280	352	450	1777	2077	2363	2730	3001
	5	279	331	421	513	635	2160	2492	2807	3208	3504
	10	1019	1135	1323	1503	1732	4163	4647	5100	5669	6083
	15	2028	2208	2494	2762	3098	6455	7101	7702	8451	8995
45	2	23	33	54	80	119	890	1091	1289	1546	1739
	3	76	98	139	185	249	1235	1470	1697	1990	2207
	4	152	187	248	311	398	1573	1838	2091	2415	2655
	5	246	293	372	453	561	1908	2201	2480	2834	3095
	10	892	994	1159	1316	1517	3642	4065	4462	4959	5321
	15	1756	1912	2159	2391	2681	5579	6135	6653	7299	7767
50	2	21	30	49	72	107	800	981	1158	1390	1563
	3	68	88	125	166	224	1109	1320	1524	1786	1982
	5	221	262	334	406	502	1709	1971	2221	2538	2772
	10	793	884	1031	1170	1349	3238	3614	3966	4408	4729
	15	1546	1684	1904	2108	2363	4914	5403	5859	6426	6838

H TABLE F: Two-Parameter Exponential Quantiles for Future Samples

Explanation of the Tables

Table F gives the quantiles, $z_{1-\alpha} \times 10^4$, at various α levels of significance, for the s^{th} observation from a future Two-Parameter Exponential random sample of size m based on a preliminary sample of size n where the preliminary test has been censored at the r^{th} failed unit. That is,

$$Pr[n(Y_s - X_1)/T_{(r)} \geq z_{1-\alpha}] = 1 - \alpha$$

where Y_s is the time to failure of the s^{th} failed unit in the second sample. $X_1, X_2, \ldots, X_n$ are the ordered failure times for the first sample and

$$T_{(r)} = \sum_{i=1}^{r}(X_i - X_1) + (n - r)(X_r - X_1) \ .$$

NOTE: The values given in these tables must be divided by 10^4 in order to obtain the proper quantile.

H.1 TABLE F($s = 2$): Two-Parameter Exponential Quantiles for Future Samples

n= 5		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
3	5	-56667	-37140	-19814	-11082	-4907	33358	53527	81947	138240	201638
	10	-82582	-55465	-31404	-19277	-10702	11821	19669	30709	52560	77163
	15	-95131	-64339	-37016	-23245	-13508	6169	10659	16964	29433	43468
	20	-102546	-69582	-40332	-25590	-15166	3770	6778	10991	19318	28687
	25	-107444	-73045	-42523	-27139	-16261	2512	4711	7785	13852	20678
	30	-110921	-75504	-44077	-28239	-17039	1766	3467	5838	10515	15773
	35	-113517	-77340	-45238	-29059	-17619	1286	2656	4558	8305	12517
	40	-115529	-78763	-46138	-29696	-18069	960	2094	3665	6755	10228
4	5	-25422	-18114	-10715	-6441	-3050	18012	26591	37320	55818	74048
	10	-34091	-24995	-15785	-10465	-6243	6632	10176	14596	22205	29699
	15	-37990	-28090	-18065	-12275	-7680	3561	5684	8324	12863	17330
	20	-40221	-29861	-19370	-13311	-8502	2226	3701	5530	8670	11759
	25	-41668	-31009	-20216	-13982	-9035	1511	2623	3998	6355	8671
	30	-42683	-31814	-20809	-14453	-9408	1079	1963	3051	4914	6743
	35	-43434	-32411	-21248	-14802	-9685	796	1525	2418	3944	5442
	40	-44013	-32870	-21587	-15071	-9898	601	1217	1970	3253	4513
5	5	-15820	-11712	-7267	-4520	-2209	12190	17298	23308	32968	41864
	10	-20427	-15586	-10348	-7111	-4388	4573	6750	9302	13397	17163
	15	-22424	-17265	-11683	-8233	-5332	2490	3826	5386	7885	10181
	20	-23548	-18210	-12435	-8865	-5864	1573	2520	3621	5381	6998
	25	-24270	-18818	-12918	-9271	-6205	1077	1803	2643	3985	5216
	30	-24774	-19241	-13255	-9555	-6443	775	1359	2034	3108	4093
	35	-25145	-19553	-13503	-9763	-6619	576	1063	1623	2513	3328
	40	-25430	-19793	-13694	-9924	-6754	437	854	1331	2087	2779

TABLE F($s = 2$) (Continued)

n= 6		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
3	5	-50302	-32640	-16968	-9069	-3484	42004	67038	102322	172217	250935
	10	-76603	-51237	-28730	-17386	-9365	15374	25285	39233	66848	97941
	15	-90000	-60711	-34721	-21623	-12361	8214	13934	21972	37877	55781
	20	-98131	-66460	-38358	-24194	-14179	5122	8973	14375	25056	37076
	25	-103592	-70322	-40800	-25921	-15400	3480	6304	10258	18071	26862
	30	-107514	-73095	-42554	-27161	-16277	2496	4684	7742	13780	20571
	35	-110467	-75183	-43874	-28095	-16937	1857	3620	6077	10925	16377
	40	-112770	-76811	-44904	-28823	-17452	1418	2879	4911	8916	13418
4	5	-23130	-16295	-9375	-5378	-2205	22525	33061	46240	68967	91366
	10	-32172	-23472	-14662	-9574	-5536	8534	12933	18423	27880	37195
	15	-36416	-26840	-17144	-11544	-7100	4682	7330	10628	16302	21888
	20	-38899	-28811	-18596	-12697	-8015	2982	4828	7120	11060	14936
	25	-40532	-30107	-19551	-13455	-8616	2062	3456	5183	8146	11061
	30	-41688	-31025	-20228	-13992	-9042	1501	2609	3978	6324	8630
	35	-42551	-31709	-20732	-14392	-9360	1131	2044	3168	5092	6983
	40	-43218	-32239	-21122	-14702	-9606	874	1646	2593	4213	5804
5	5	-14557	-10649	-6422	-3809	-1612	15194	21431	28772	40574	51443
	10	-19428	-14746	-9680	-6549	-3916	5853	8531	11674	16719	21360
	15	-21623	-16591	-11147	-7783	-4953	3253	4901	6830	9922	12764
	20	-22883	-17651	-11990	-8492	-5550	2094	3263	4628	6811	8817
	25	-23703	-18341	-12539	-8953	-5937	1460	2357	3400	5066	6596
	30	-24280	-18826	-12925	-9277	-6210	1071	1793	2630	3966	5191
	35	-24708	-19186	-13211	-9518	-6413	812	1414	2110	3217	4233
	40	-25039	-19464	-13432	-9704	-6569	631	1145	1737	2679	3542
6	5	-10518	-7862	-4871	-2946	-1270	11415	15733	20629	28173	34840
	10	-13714	-10645	-7188	-4963	-3026	4441	6328	8460	11737	14631
	15	-15119	-11867	-8206	-5849	-3797	2487	3664	4990	7025	8820
	20	-15917	-12562	-8784	-6352	-4236	1611	2455	3403	4856	6136
	25	-16433	-13011	-9158	-6678	-4519	1129	1783	2514	3632	4617
	30	-16794	-13325	-9420	-6906	-4717	832	1362	1954	2857	3652
	35	-17061	-13558	-9613	-7074	-4864	633	1079	1573	2327	2990
	40	-17267	-13737	-9763	-7204	-4977	493	877	1300	1945	2512

TABLE F($s = 2$) (Continued)

n= 7		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
3	5	-45048	-28925	-14618	-7408	-2309	50790	80754	122989	206660	300895
	10	-71349	-47522	-26380	-15725	-8190	19069	31102	48045	81592	119368
	15	-85346	-57420	-32640	-20151	-11320	10376	17376	27219	46698	68628
	20	-94049	-63574	-36532	-22903	-13266	6571	11305	17953	31102	45902
	25	-99985	-67771	-39187	-24780	-14593	4528	8010	12893	22546	33408
	30	-104294	-70818	-41114	-26143	-15557	3292	5996	9782	17260	25674
	35	-107563	-73130	-42576	-27177	-16288	2484	4665	7713	13729	20497
	40	-110129	-74944	-43724	-27988	-16862	1925	3734	6258	11235	16833
4	5	-21177	-14745	-8232	-4471	-1486	27099	39608	55259	82252	108856
	10	-30448	-22104	-13654	-8774	-4901	10496	15767	22349	33690	44862
	15	-34964	-25688	-16295	-10871	-6565	5854	9043	13016	19856	26592
	20	-37661	-27828	-17872	-12122	-7558	3783	6011	8781	13546	18235
	25	-39456	-29254	-18922	-12956	-8220	2651	4336	6427	10019	13553
	30	-40740	-30272	-19673	-13551	-8693	1956	3296	4956	7804	10604
	35	-41703	-31037	-20236	-13998	-9047	1495	2599	3963	6302	8601
	40	-42453	-31632	-20674	-14346	-9324	1171	2106	3256	5227	7163
5	5	-13462	-9729	-5690	-3194	-1095	18233	25607	34288	48247	61103
	10	-18522	-13984	-9074	-6039	-3487	7170	10356	14099	20108	25637
	15	-20878	-15965	-10649	-7364	-4601	4047	6015	8320	12016	15415
	20	-22257	-17124	-11571	-8139	-5253	2641	4039	5673	8290	10695
	25	-23164	-17888	-12178	-8650	-5682	1866	2939	4189	6189	8026
	30	-23807	-18428	-12608	-9011	-5987	1387	2251	3255	4860	6333
	35	-24288	-18832	-12929	-9281	-6214	1066	1786	2621	3953	5174
	40	-24660	-19145	-13178	-9491	-6390	840	1455	2166	3299	4338
7	5	-7657	-5731	-3503	-2030	-717	10924	14764	19012	25373	30842
	10	-10112	-7918	-5380	-3702	-2207	4360	6064	7943	10751	13161
	15	-11205	-8891	-6216	-4447	-2871	2491	3565	4747	6509	8021
	20	-11831	-9449	-6695	-4873	-3251	1641	2418	3270	4539	5626
	25	-12239	-9813	-7007	-5151	-3498	1169	1774	2436	3419	4262
	30	-12525	-10068	-7226	-5346	-3672	875	1369	1907	2706	3389
	35	-12738	-10257	-7389	-5491	-3801	677	1093	1545	2215	2788
	40	-12903	-10404	-7514	-5603	-3901	536	896	1285	1860	2352

TABLE F($s = 2$) (Continued)

n= 8		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
3	5	-40637	-25806	-12846	-6013	-1323	59674	94611	143860	241428	351317
	10	-66696	-44233	-24300	-14254	-7150	22871	37073	57075	96684	141288
	15	-81107	-54422	-30744	-18810	-10372	12632	20951	32654	55820	81902
	20	-90264	-60897	-34840	-21706	-12420	8099	13750	21690	37401	55087
	25	-96600	-65378	-37673	-23710	-13837	5642	9811	15662	27233	40256
	30	-101245	-68662	-39750	-25179	-14875	4146	7390	11936	20922	31034
	35	-104797	-71174	-41339	-26302	-15669	3161	5781	9447	16690	24839
	40	-107600	-73156	-42592	-27188	-16296	2476	4651	7691	13691	20441
4	5	-19488	-13405	-7245	-3687	-863	31714	46209	64347	95833	126468
	10	-28891	-20868	-12744	-8052	-4328	12504	18659	26350	39602	52658
	15	-33621	-24622	-15510	-10247	-6070	7068	10807	15471	23501	31409
	20	-36498	-26905	-17192	-11582	-7130	4619	7238	10499	16109	21632
	25	-38436	-28444	-18326	-12482	-7844	3271	5255	7720	11958	16129
	30	-39833	-29553	-19143	-13131	-8359	2437	4017	5977	9342	12652
	35	-40889	-30390	-19760	-13620	-8747	1881	3184	4796	7563	10283
	40	-41714	-31045	-20242	-14003	-9051	1490	2592	3953	6286	8579
5	5	-12503	-8922	-5048	-2654	-641	21297	29813	39841	55967	70820
	10	-17694	-13288	-8520	-5574	-3096	8514	12215	16563	23547	29974
	15	-20184	-15381	-10185	-6974	-4273	4867	7158	9845	14155	18120
	20	-21665	-16627	-11175	-7806	-4973	3210	4841	6749	9807	12618
	25	-22650	-17455	-11834	-8360	-5439	2291	3544	5006	7346	9497
	30	-23353	-18047	-12305	-8756	-5772	1719	2728	3904	5784	7511
	35	-23882	-18491	-12658	-9053	-6022	1335	2176	3154	4715	6148
	40	-24293	-18837	-12933	-9284	-6216	1063	1781	2614	3943	5162
8	5	-5896	-4397	-2631	-1440	-361	10586	14107	17933	23547	28277
	10	-7898	-6210	-4221	-2881	-1666	4307	5885	7595	10099	12206
	15	-8800	-7028	-4938	-3530	-2254	2497	3500	4583	6167	7499
	20	-9322	-7500	-5353	-3905	-2594	1666	2396	3182	4329	5292
	25	-9663	-7809	-5624	-4151	-2817	1201	1772	2385	3278	4026
	30	-9904	-8027	-5816	-4325	-2974	909	1378	1877	2606	3217
	35	-10083	-8190	-5958	-4454	-3091	711	1106	1528	2142	2656
	40	-10222	-8316	-6069	-4554	-3182	570	912	1276	1805	2247

TABLE F($s = 2$) (Continued)

n= 9		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
3	5	-36881	-23150	-10966	-4825	-483	68629	108570	164877	276431	402074
	10	-62548	-41299	-22444	-12942	-6222	26756	43163	66275	112047	163592
	15	-77228	-51679	-29009	-17584	-9505	14964	24634	38243	65186	95522
	20	-86745	-58409	-33266	-20593	-11633	9692	16287	25560	43911	64569
	25	-93418	-63127	-36250	-22703	-13125	6813	11692	18546	32101	47360
	30	-98355	-66619	-38458	-24265	-14229	5048	8852	14189	24740	36615
	35	-102157	-69307	-40158	-25467	-15079	3880	6957	11268	19787	29374
	40	-105175	-71441	-41508	-26422	-15754	3064	5621	9200	16268	24220
4	5	-18011	-12232	-6381	-3002	-319	36359	52849	73486	109083	144169
	10	-27476	-19744	-11916	-7395	-3806	14547	21598	30408	45594	60556
	15	-32374	-23633	-14781	-9668	-5611	8314	12613	17978	27218	36319
	20	-35403	-26036	-16552	-11074	-6727	5484	8502	12263	18736	25109
	25	-37467	-27675	-17759	-12032	-7487	3916	6206	9054	13954	18776
	30	-38967	-28865	-18636	-12728	-8039	2941	4766	7033	10929	14762
	35	-40105	-29769	-19302	-13257	-8459	2288	3794	5661	8867	12020
	40	-41000	-30479	-19825	-13672	-8789	1826	3101	4678	7384	10044
5	5	-11652	-8207	-4480	-2176	-239	24379	34042	45421	63722	80577
	10	-16935	-12649	-8012	-5146	-2737	9879	14098	19058	27025	34358
	15	-19534	-14835	-9751	-6608	-3966	5706	8325	11398	16330	20868
	20	-21104	-16155	-10800	-7491	-4708	3797	5664	7851	11356	14580
	25	-22159	-17042	-11506	-8084	-5207	2732	4167	5845	8531	11001
	30	-22917	-17680	-12013	-8511	-5566	2065	3223	4573	6733	8718
	35	-23490	-18162	-12396	-8833	-5836	1616	2581	3704	5499	7148
	40	-23937	-18538	-12695	-9084	-6048	1297	2121	3078	4607	6010
9	5	-4715	-3493	-2033	-1034	-119	10339	13632	17163	22264	26499
	10	-6412	-5050	-3421	-2307	-1286	4269	5756	7346	9638	11538
	15	-7186	-5759	-4054	-2887	-1818	2504	3454	4467	5925	7133
	20	-7636	-6173	-4422	-3225	-2128	1688	2382	3119	4160	5057
	25	-7933	-6444	-4665	-3448	-2332	1228	1772	2350	3179	3864
	30	-8143	-6637	-4837	-3605	-2476	937	1384	1857	2535	3096
	35	-8300	-6781	-4965	-3723	-2584	740	1119	1518	2090	2563
	40	-8422	-6893	-5065	-3815	-2668	598	926	1272	1766	2174

TABLE F($s = 2$) (Continued)

n= 10		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
3	5	-33644	-20861	-9518	-3801	242	77637	122605	186004	311611	453082
	10	-58825	-38666	-20779	-11764	-5390	30706	49348	75610	127625	186202
	15	-73666	-49161	-27417	-16458	-8708	17357	28405	43959	74753	109427
	20	-83465	-56089	-31799	-19556	-10899	11340	18904	29542	50598	74304
	25	-90419	-61007	-34909	-21755	-12454	8032	13642	21527	37125	54684
	30	-95612	-64679	-37231	-23397	-13616	5992	10375	16527	28694	42389
	35	-99637	-67525	-39031	-24670	-14516	4636	8186	13164	23004	34078
	40	-102848	-69796	-40467	-25686	-15234	3685	6638	10775	18950	28148
4	5	-16706	-11197	-5618	-2396	162	41027	59519	82663	122586	161936
	10	-26182	-18718	-11160	-6794	-3330	16619	24572	34513	51649	68533
	15	-31213	-22711	-14101	-9129	-5183	9588	14454	20529	30995	41304
	20	-34371	-25217	-15948	-10595	-6346	6374	9798	14067	21417	28654
	25	-36546	-26943	-17220	-11605	-7148	4582	7184	10424	15997	21483
	30	-38137	-28206	-18150	-12343	-7734	3464	5540	8121	12559	16926
	35	-39352	-29171	-18861	-12907	-8181	2712	4426	6554	10209	13805
	40	-40311	-29932	-19422	-13352	-8535	2178	3629	5428	8516	11553
5	5	-10891	-7567	-3971	-1748	121	27475	38287	51021	71502	90366
	10	-16234	-12060	-7544	-4753	-2406	11260	16002	21577	30534	38779
	15	-18925	-14323	-9343	-6266	-3678	6561	9511	12975	18535	23651
	20	-20572	-15708	-10445	-7192	-4457	4398	6505	8973	12932	16574
	25	-21689	-16647	-11192	-7820	-4985	3185	4806	6702	9741	12534
	30	-22498	-17327	-11733	-8275	-5367	2424	3731	5258	7703	9950
	35	-23111	-17843	-12143	-8620	-5657	1908	2998	4270	6303	8171
	40	-23593	-18248	-12465	-8891	-5885	1540	2472	3556	5288	6879
10	5	-3874	-2846	-1602	-742	54	10150	13273	16586	21315	25195
	10	-5352	-4214	-2838	-1887	-1005	4241	5659	7159	9296	11046
	15	-6033	-4844	-3407	-2414	-1493	2511	3420	4380	5745	6862
	20	-6432	-5214	-3742	-2723	-1780	1707	2372	3074	4069	4884
	25	-6697	-5459	-3962	-2928	-1969	1251	1774	2325	3105	3743
	30	-6885	-5633	-4120	-3073	-2104	962	1392	1844	2484	3007
	35	-7026	-5764	-4238	-3182	-2205	764	1130	1512	2053	2495
	40	-7135	-5865	-4329	-3267	-2284	622	939	1270	1738	2120

TABLE F($s = 2$) (Continued)

n= 12		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
3	5	-28348	-17116	-7150	-2127	1512	95762	150837	228491	382343	555628
	10	-52419	-34137	-17915	-9739	-3957	38757	61931	94587	159269	232113
	15	-67349	-44694	-24592	-14460	-7298	22290	36159	55689	94362	137912
	20	-77529	-51892	-29144	-17679	-9572	14770	24327	37778	64404	94385
	25	-84916	-57116	-32448	-20015	-11224	10590	17713	27731	47557	69877
	30	-90521	-61079	-34954	-21788	-12477	7988	13572	21420	36944	54421
	35	-94921	-64190	-36922	-23179	-13461	6244	10780	17148	29742	43918
	40	-98465	-66696	-38507	-24300	-14254	5012	8794	14099	24587	36392
4	5	-14500	-9446	-4328	-1372	1021	50411	72921	101097	149703	197613
	10	-23901	-16907	-9825	-5735	-2489	20826	30602	42826	63901	84668
	15	-29111	-21043	-12873	-8154	-4409	12197	18216	25734	38688	51451
	20	-32472	-23710	-14838	-9714	-5647	8211	12463	17769	26907	35908
	25	-34829	-25581	-16216	-10808	-6515	5969	9209	13248	20199	27044
	30	-36577	-26968	-17238	-11619	-7159	4559	7149	10375	15923	21385
	35	-37926	-28039	-18027	-12245	-7656	3603	5745	8409	12988	17496
	40	-39000	-28891	-18655	-12744	-8052	2921	4736	6991	10866	14678
5	5	-9583	-6467	-3096	-1012	770	33695	46812	62264	87117	110010
	10	-14984	-11009	-6708	-4049	-1814	14061	19855	26670	37622	47705
	15	-17812	-13387	-8599	-5640	-3151	8309	11929	16183	23013	29300
	20	-19585	-14878	-9785	-6637	-3990	5636	8228	11269	16148	20637
	25	-20808	-15907	-10603	-7325	-4568	4125	6123	8464	12217	15669
	30	-21705	-16661	-11202	-7829	-4992	3169	4783	6671	9697	12479
	35	-22391	-17238	-11661	-8215	-5317	2518	3865	5439	7959	10274
	40	-22934	-17694	-12024	-8520	-5574	2052	3203	4546	6695	8669
10	5	-3481	-2482	-1273	-438	346	12409	16174	20170	25874	30554
	10	-5022	-3909	-2562	-1631	-769	5265	6980	8794	11379	13497
	15	-5756	-4588	-3176	-2199	-1295	3157	4257	5419	7074	8428
	20	-6194	-4994	-3543	-2539	-1609	2168	2974	3824	5033	6022
	25	-6489	-5266	-3789	-2767	-1820	1604	2239	2906	3854	4629
	30	-6700	-5462	-3966	-2930	-1972	1245	1766	2314	3092	3727
	35	-6860	-5610	-4099	-3054	-2086	998	1440	1904	2562	3099
	40	-6985	-5726	-4204	-3151	-2176	819	1203	1605	2174	2638
12	5	-2768	-1989	-1030	-357	284	9883	12767	15780	20007	23415
	10	-3951	-3099	-2052	-1316	-625	4204	5523	6897	8821	10370
	15	-4506	-3620	-2531	-1766	-1047	2525	3376	4260	5496	6490
	20	-4835	-3929	-2816	-2033	-1299	1738	2363	3012	3918	4646
	25	-5056	-4136	-3006	-2212	-1466	1288	1781	2292	3005	3577
	30	-5213	-4284	-3143	-2340	-1587	1001	1408	1828	2414	2885
	35	-5332	-4396	-3245	-2437	-1677	803	1149	1506	2003	2402
	40	-5425	-4483	-3326	-2512	-1748	660	961	1271	1702	2047

TABLE F($s = 2$) (Continued)

n= 15		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
3	5	-22444	-12942	-4510	-260	3287	123124	193441	292590	489035	710297
	10	-44772	-28730	-14495	-7321	-2247	51087	81173	123577	207576	302178
	15	-59481	-39130	-21073	-11972	-5536	29956	48169	73826	124641	181866
	20	-69916	-46509	-25739	-15272	-7870	20167	32823	50643	85929	125663
	25	-77706	-52017	-29223	-17735	-9612	14657	24149	37507	63950	93724
	30	-83744	-56287	-31923	-19644	-10962	11192	18668	29184	49995	73426
	35	-88561	-59693	-34078	-21168	-12039	8847	14942	23509	40461	59544
	40	-92494	-62474	-35837	-22411	-12918	7175	12273	19433	33598	49542
4	5	-11916	-7395	-2816	-172	2227	64564	93124	128878	190558	251358
	10	-21072	-14662	-8171	-4422	-1447	27244	39787	55475	82526	109185
	15	-26412	-18900	-11294	-6901	-3414	16225	24003	33725	50482	66993
	20	-29972	-21726	-13376	-8553	-4726	11076	16600	23498	35384	47093
	25	-32529	-23755	-14871	-9740	-5668	8151	12376	17648	26727	35669
	30	-34459	-25287	-16000	-10636	-6379	6294	9681	13905	21175	28334
	35	-35970	-26486	-16883	-11337	-6935	5026	7833	11329	17345	23268
	40	-37185	-27450	-17594	-11901	-7383	4114	6498	9463	14563	19584
5	5	-8012	-5146	-2046	-129	1685	43070	59657	79198	110630	139584
	10	-13403	-9680	-5651	-3161	-1067	18327	25713	34405	48375	61239
	15	-16359	-12165	-7627	-4823	-2465	10997	15637	21092	29855	37921
	20	-18269	-13772	-8905	-5897	-3368	7558	10891	14806	21091	26875
	25	-19615	-14903	-9805	-6654	-4004	5596	8172	11193	16043	20504
	30	-20618	-15746	-10475	-7218	-4478	4344	6429	8872	12790	16394
	35	-21394	-16399	-10995	-7654	-4846	3486	5229	7268	10537	13542
	40	-22015	-16921	-11410	-8003	-5139	2867	4358	6101	8893	11459
10	5	-2989	-2026	-862	-57	761	15810	20541	25562	32732	38614
	10	-4592	-3511	-2203	-1298	-461	6821	8981	11269	14530	17203
	15	-5384	-4244	-2865	-1912	-1029	4144	5533	7002	9094	10807
	20	-5870	-4694	-3272	-2288	-1377	2880	3898	4974	6504	7756
	25	-6202	-5001	-3549	-2544	-1615	2153	2955	3800	5001	5984
	30	-6443	-5224	-3751	-2731	-1788	1687	2346	3040	4027	4833
	35	-6627	-5395	-3905	-2874	-1920	1364	1924	2512	3347	4029
	40	-6773	-5529	-4026	-2986	-2024	1130	1616	2125	2847	3437
15	5	-1831	-1259	-546	-37	491	9631	12297	15040	18822	21821
	10	-2750	-2134	-1365	-816	-294	4172	5398	6657	8389	9760
	15	-3191	-2553	-1758	-1190	-650	2544	3338	4152	5270	6155
	20	-3457	-2807	-1996	-1416	-865	1773	2359	2958	3782	4432
	25	-3637	-2978	-2156	-1569	-1010	1329	1793	2267	2917	3430
	30	-3767	-3102	-2272	-1679	-1115	1044	1427	1818	2354	2777
	35	-3866	-3196	-2360	-1763	-1195	846	1173	1506	1961	2321
	40	-3944	-3270	-2430	-1829	-1258	703	987	1277	1672	1985

TABLE F($s = 2$) (Continued)

n= 20		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
3	5	-15820	-8257	-1547	1982	6147	168973	264808	399945	667701	969285
	10	-35486	-22163	-10342	-4384	-171	72033	113817	172717	289403	420823
	15	-49409	-32008	-16568	-8787	-3284	43173	68821	104963	176553	257179
	20	-59798	-39355	-21215	-12072	-5607	29602	47613	72986	123236	179825
	25	-67850	-45048	-24816	-14618	-7408	21857	35477	54656	92634	135401
	30	-74274	-49590	-27688	-16650	-8844	16925	27723	42923	73017	106903
	35	-79518	-53299	-30034	-18308	-10017	13550	22400	34852	59502	87256
	40	-83881	-56384	-31985	-19688	-10992	11120	18554	29010	49703	73000
4	5	-8821	-4938	-1006	1343	4172	88261	126940	175367	258912	341266
	10	-17453	-11789	-6054	-2742	-114	38111	55314	76838	113956	150539
	15	-22802	-16035	-9183	-5225	-2084	23126	33891	47353	70563	93434
	20	-26523	-18988	-11359	-6952	-3455	16039	23736	33355	49934	66269
	25	-29280	-21177	-12971	-8232	-4471	11968	17885	25275	38009	50554
	30	-31412	-22869	-14218	-9222	-5256	9358	14121	20067	30308	40396
	35	-33113	-24219	-15213	-10011	-5883	7559	11518	16457	24963	33339
	40	-34502	-25322	-16025	-10656	-6395	6255	9625	13826	21058	28179
5	5	-6069	-3512	-746	1016	3160	58762	81147	107522	149948	189031
	10	-11327	-7934	-4263	-1993	-85	25537	35600	47445	66488	84024
	15	-14374	-10496	-6300	-3706	-1526	15591	21953	29438	41466	52540
	20	-16419	-12216	-7668	-4857	-2493	10873	15466	20864	29537	37519
	25	-17902	-13462	-8659	-5690	-3194	8155	11717	15900	22618	28800
	30	-19030	-14411	-9413	-6325	-3727	6407	9297	12689	18134	23143
	35	-19920	-15159	-10008	-6825	-4148	5198	7618	10456	15010	19200
	40	-20640	-15765	-10490	-7230	-4489	4318	6392	8823	12721	16306
10	5	-2347	-1431	-325	459	1431	21498	27841	34574	44189	52077
	10	-4002	-2964	-1709	-841	-38	9443	12350	15431	19823	23423
	15	-4858	-3757	-2425	-1504	-651	5823	7696	9679	12504	14818
	20	-5400	-4258	-2878	-1924	-1040	4099	5474	6928	8999	10695
	25	-5778	-4609	-3195	-2216	-1311	3100	4183	5328	6956	8289
	30	-6059	-4868	-3429	-2434	-1512	2454	3346	4287	5625	6720
	35	-6276	-5069	-3610	-2602	-1667	2005	2762	3559	4693	5620
	40	-6449	-5229	-3755	-2736	-1791	1677	2333	3024	4006	4808
15	5	-1451	-898	-208	296	925	13084	16650	20321	25382	29396
	10	-2416	-1816	-1068	-533	-24	5765	7409	9098	11421	13261
	15	-2899	-2276	-1498	-943	-414	3565	4631	5724	7227	8416
	20	-3199	-2562	-1766	-1197	-657	2516	3302	4108	5216	6092
	25	-3407	-2759	-1951	-1373	-824	1907	2530	3167	4042	4733
	30	-3559	-2904	-2087	-1503	-947	1513	2028	2554	3276	3846
	35	-3677	-3016	-2192	-1603	-1042	1239	1677	2125	2739	3223
	40	-3770	-3105	-2275	-1682	-1118	1038	1420	1809	2342	2763
20	5	-1050	-654	-153	219	684	9395	11858	14357	17745	20388
	10	-1729	-1309	-776	-390	-18	4146	5285	6437	7996	9210
	15	-2063	-1631	-1083	-686	-303	2567	3308	4055	5067	5854
	20	-2269	-1830	-1273	-869	-480	1814	2362	2915	3661	4242
	25	-2411	-1967	-1403	-995	-601	1377	1811	2249	2841	3300
	30	-2515	-2067	-1499	-1087	-690	1093	1453	1816	2305	2685
	35	-2595	-2144	-1572	-1158	-758	896	1203	1512	1929	2252
	40	-2658	-2205	-1630	-1214	-812	751	1019	1288	1651	1933

TABLE F($s = 2$) (Continued)

n= 25		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
3	5	-11442	-5162	413	3954	8961	214974	336400	507628	846898	1229032
	10	-28892	-17501	-7393	-2299	1371	93248	146852	222421	372135	540757
	15	-41887	-26690	-13205	-6408	-1602	56713	89938	136766	229532	334008
	20	-51955	-33809	-17707	-9592	-3853	39376	62891	96026	161656	235568
	25	-59985	-39487	-21298	-12131	-5649	29395	47289	72496	122419	178639
	30	-66541	-44123	-24230	-14205	-7115	22985	37246	57330	97101	141886
	35	-71995	-47979	-26669	-15929	-8335	18565	30304	46830	79553	116399
	40	-76603	-51237	-28730	-17386	-9365	15360	25257	39186	66761	97810
4	5	-6628	-3198	277	2694	6087	112026	160848	221974	327432	431387
	10	-14731	-9629	-4463	-1479	925	49095	70992	98395	145656	192236
	15	-19971	-13788	-7527	-3912	-1042	30165	43957	61209	90956	120272
	20	-23733	-16774	-9727	-5657	-2427	21148	31057	43448	64809	85859
	25	-26588	-19040	-11397	-6983	-3479	15931	23580	33139	49615	65849
	30	-28839	-20826	-12713	-8027	-4308	12563	18740	26457	39755	52855
	35	-30662	-22274	-13779	-8874	-4980	10228	15376	21805	32880	43789
	40	-32172	-23472	-14662	-9574	-5536	8525	12917	18398	27838	37136
5	5	-4643	-2313	208	2045	4613	74496	102690	135910	189351	238580
	10	-9721	-6583	-3188	-1090	698	32816	45571	60589	84734	106970
	15	-12779	-9155	-5233	-2809	-771	20265	28368	37904	53231	67343
	20	-14891	-10930	-6645	-3997	-1770	14275	20145	27048	38142	48354
	25	-16455	-12246	-7691	-4877	-2510	10801	15366	20732	29352	37286
	30	-17666	-13264	-8501	-5558	-3082	8553	12266	16627	23632	30078
	35	-18635	-14079	-9149	-6103	-3541	6990	10105	13762	19633	25035
	40	-19428	-14746	-9680	-6549	-3916	5847	8521	11658	16692	21323
10	5	-1847	-969	93	928	2091	27200	35156	43603	55665	65561
	10	-3523	-2521	-1309	-471	314	12086	15742	19617	25144	29673
	15	-4418	-3349	-2057	-1163	-336	7526	9886	12385	15947	18866
	20	-4997	-3886	-2542	-1612	-751	5343	7078	8913	11528	13670
	25	-5409	-4267	-2886	-1931	-1046	4072	5440	6886	8944	10630
	30	-5719	-4554	-3145	-2171	-1268	3246	4373	5563	7256	8642
	35	-5961	-4778	-3348	-2358	-1442	2670	3626	4635	6070	7245
	40	-6156	-4959	-3511	-2509	-1582	2247	3076	3951	5195	6213
15	5	-1151	-613	60	601	1353	16544	21012	25810	31952	36981
	10	-2141	-1555	-823	-300	202	7370	9432	11551	14468	16778
	15	-2652	-2041	-1278	-733	-215	4600	5938	7311	9200	10695
	20	-2976	-2350	-1567	-1008	-477	3273	4261	5274	6667	7769
	25	-3204	-2566	-1770	-1202	-661	2500	3282	4083	5184	6055
	30	-3374	-2728	-1922	-1346	-798	1997	2643	3305	4214	4933
	35	-3506	-2854	-2040	-1458	-905	1645	2196	2759	3532	4143
	40	-3612	-2955	-2134	-1548	-990	1386	1866	2356	3028	3559
20	5	-836	-448	44	444	1000	11876	14960	18088	22331	25640
	10	-1537	-1124	-600	-220	149	5297	6724	8168	10123	11645
	15	-1892	-1466	-927	-535	-158	3310	4238	5176	6445	7432
	20	-2116	-1682	-1132	-734	-349	2357	3044	3738	4676	5405
	25	-2273	-1833	-1276	-872	-483	1802	2347	2897	3639	4217
	30	-2389	-1945	-1383	-975	-582	1441	1892	2347	2961	3439
	35	-2479	-2032	-1466	-1055	-659	1188	1573	1961	2484	2891
	40	-2551	-2102	-1532	-1119	-720	1002	1338	1676	2131	2485

TABLE F($s = 2$) (Continued)

n= 25		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
25	5	-656	-353	35	352	793	9260	11610	13973	17145	19597
	10	-1198	-880	-472	-174	118	4133	5222	6314	7777	8906
	15	-1471	-1144	-727	-421	-125	2584	3293	4004	4955	5688
	20	-1641	-1310	-886	-576	-275	1842	2367	2893	3597	4139
	25	-1760	-1425	-997	-684	-380	1409	1826	2243	2801	3231
	30	-1848	-1511	-1080	-764	-458	1127	1473	1819	2281	2636
	35	-1917	-1577	-1144	-826	-518	930	1225	1520	1914	2218
	40	-1971	-1630	-1194	-876	-566	784	1042	1300	1643	1907

TABLE F($s = 2$) (Continued)

n= 30		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
3	5	-8334	-2964	1925	5846	11751	261051	408107	615480	1026368	1489170
	10	-23968	-14019	-5191	-742	2777	114610	180101	272435	455367	661403
	15	-36057	-22567	-10597	-4564	-299	70440	111327	168961	283135	411726
	20	-45696	-29383	-14908	-7613	-2454	49359	78469	119494	200761	292284
	25	-53564	-34947	-18427	-10101	-4213	37149	59411	90779	152908	222878
	30	-60109	-39574	-21354	-12170	-5677	29260	47078	72177	121885	177863
	35	-65638	-43484	-23826	-13919	-6913	23790	38509	59238	100288	146513
	40	-70372	-46831	-25943	-15416	-7972	19804	32251	49777	84480	123557
4	5	-4980	-1889	1307	3993	7986	135828	194803	268645	396040	521621
	10	-12597	-7935	-3215	-489	1880	60142	86755	120061	177507	234126
	15	-17682	-11971	-6188	-2849	-198	37284	54126	75198	111534	147346
	20	-21421	-14939	-8375	-4584	-1575	26344	38493	53688	79886	105703
	25	-24314	-17235	-10067	-5927	-2641	19985	29392	41153	61428	81406
	30	-26631	-19074	-11422	-7003	-3495	15860	23478	32998	49407	65575
	35	-28533	-20583	-12534	-7885	-4196	12987	19351	27300	40999	54495
	40	-30124	-21846	-13465	-8624	-4782	10884	16322	23114	34814	46341
5	5	-3540	-1386	989	3035	6056	90252	124260	164333	228798	288183
	10	-8430	-5498	-2325	-364	1422	40134	55590	73791	103056	130007
	15	-11461	-8046	-4352	-2068	-148	24988	34842	46441	65087	82256
	20	-13600	-9845	-5782	-3271	-1160	17728	24887	33309	46845	59308
	25	-15212	-11201	-6860	-4178	-1922	13501	19081	25643	36187	45893
	30	-16478	-12265	-7707	-4890	-2521	10754	15301	20645	29231	37133
	35	-17502	-13127	-8392	-5466	-3005	8836	12657	17146	24354	30988
	40	-18350	-13839	-8959	-5942	-3406	7429	10713	14569	20759	26455
10	5	-1442	-594	447	1382	2748	32908	42479	52640	67150	79056
	10	-3122	-2150	-974	-160	641	14740	19147	23818	30481	35942
	15	-4041	-3000	-1742	-871	-66	9243	12091	15108	19409	22934
	20	-4647	-3561	-2248	-1340	-500	6603	8698	10917	14078	16668
	25	-5083	-3965	-2613	-1678	-813	5061	6714	8463	10954	12995
	30	-5415	-4273	-2891	-1935	-1051	4055	5417	6858	8909	10588
	35	-5677	-4515	-3110	-2138	-1239	3351	4508	5730	7470	8894
	40	-5890	-4712	-3288	-2303	-1391	2832	3836	4896	6405	7639
15	5	-905	-378	289	895	1778	20008	25377	30904	38527	44572
	10	-1909	-1334	-616	-103	414	8981	11463	14013	17523	20304
	15	-2438	-1837	-1087	-552	-42	5643	7254	8908	11184	12985
	20	-2780	-2163	-1393	-842	-318	4039	5229	6450	8129	9458
	25	-3024	-2395	-1610	-1049	-515	3101	4043	5010	6338	7388
	30	-3208	-2570	-1773	-1205	-663	2489	3268	4067	5164	6031
	35	-3352	-2707	-1902	-1327	-780	2060	2724	3403	4337	5075
	40	-3468	-2817	-2005	-1425	-874	1744	2322	2913	3725	4366
20	5	-659	-277	213	662	1314	14360	18065	21823	26920	30896
	10	-1374	-966	-450	-76	306	6452	8168	9905	12255	14086
	15	-1744	-1323	-790	-404	-31	4058	5174	6303	7830	9018
	20	-1981	-1552	-1008	-614	-234	2907	3733	4568	5697	6575
	25	-2149	-1714	-1162	-763	-377	2234	2889	3551	4445	5141
	30	-2275	-1835	-1278	-874	-485	1795	2337	2885	3625	4200
	35	-2374	-1930	-1369	-961	-569	1486	1950	2417	3047	3537
	40	-2453	-2007	-1442	-1032	-637	1259	1663	2070	2619	3045

TABLE F($s = 2$) (Continued)

n= 30		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
25	5	-518	-219	169	525	1042	11195	14018	16855	20666	23611
	10	-1073	-758	-355	-60	243	5033	6342	7654	9413	10770
	15	-1357	-1034	-621	-318	-25	3168	4020	4874	6018	6899
	20	-1539	-1210	-790	-483	-185	2270	2902	3534	4381	5033
	25	-1666	-1334	-910	-599	-297	1746	2247	2749	3420	3938
	30	-1762	-1427	-999	-686	-382	1403	1819	2234	2790	3219
	35	-1837	-1500	-1069	-754	-448	1162	1518	1872	2347	2712
	40	-1897	-1558	-1125	-808	-501	985	1295	1604	2018	2336
30	5	-427	-181	140	435	864	9173	11450	13726	16764	19096
	10	-880	-623	-293	-49	201	4126	5182	6236	7638	8713
	15	-1111	-848	-511	-263	-20	2597	3286	3972	4885	5584
	20	-1257	-991	-650	-398	-153	1862	2373	2881	3557	4075
	25	-1360	-1092	-747	-493	-245	1432	1838	2242	2778	3189
	30	-1437	-1167	-820	-564	-315	1151	1488	1823	2267	2608
	35	-1497	-1226	-877	-620	-369	954	1242	1528	1907	2198
	40	-1546	-1273	-922	-664	-413	809	1060	1310	1640	1893

TABLE F($s = 2$) (Continued)

n= 35		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
3	5	-6013	-1323	3299	7698	14527	307172	479880	723428	1205996	1749535
	10	-20151	-11320	-3484	468	4141	136060	213480	322637	538901	782481
	15	-31404	-19277	-8516	-3093	756	84286	132887	201402	337135	490009
	20	-40586	-25770	-12623	-5997	-1311	59477	94243	143244	240315	349640
	25	-48222	-31169	-16038	-8411	-3019	45047	71741	109359	183875	267794
	30	-54674	-35731	-18923	-10452	-4461	35684	57122	87328	147156	214532
	35	-60196	-39636	-21393	-12198	-5696	29165	46928	71951	121508	177316
	40	-64977	-43017	-23531	-13710	-6765	24394	39456	60669	102676	149981
4	5	-3887	-863	2251	5267	9877	159650	228787	315352	464699	611920
	10	-10871	-6565	-2205	314	2808	71228	102569	141794	209450	276134
	15	-15785	-10465	-5079	-1968	508	44454	64362	89272	132231	174570
	20	-19468	-13389	-7233	-3678	-856	31599	46004	64023	95094	125715
	25	-22364	-15687	-8926	-5022	-1923	24101	35284	49269	73380	97139
	30	-24712	-17551	-10300	-6112	-2788	19221	28297	39643	59202	78475
	35	-26661	-19098	-11440	-7017	-3506	15810	23406	32899	49261	65381
	40	-28308	-20405	-12403	-7781	-4113	13305	19807	27931	41931	55723
5	5	-2654	-641	1709	4007	7492	106021	145847	192777	268272	337818
	10	-7364	-4601	-1612	236	2125	47476	65639	87029	121424	153100
	15	-10348	-7111	-3607	-1442	383	29740	41353	55023	77001	97239
	20	-12491	-8913	-5041	-2648	-635	21217	29671	39621	55614	70340
	25	-14129	-10290	-6136	-3569	-1410	16238	22841	30608	43090	54582
	30	-15431	-11385	-7007	-4301	-2026	12993	18381	24718	34900	44272
	35	-16495	-12279	-7718	-4899	-2529	10721	15255	20584	29146	37026
	40	-17382	-13025	-8311	-5398	-2948	9049	12950	17534	24895	31670
10	5	-1103	-280	777	1828	3401	38620	49806	61682	78642	92557
	10	-2779	-1832	-687	106	961	17402	22560	28028	35828	42221
	15	-3713	-2696	-1467	-617	171	10969	14307	17843	22884	27016
	20	-4337	-3274	-1989	-1100	-278	7872	10330	12933	16642	19682
	25	-4792	-3695	-2370	-1453	-604	6059	7999	10053	12979	15375
	30	-5141	-4019	-2662	-1723	-854	4875	6474	8166	10576	12550
	35	-5419	-4277	-2895	-1939	-1054	4043	5401	6838	8883	10558
	40	-5647	-4487	-3085	-2115	-1217	3429	4609	5855	7629	9082
15	5	-696	-179	503	1184	2201	23474	29746	36202	45105	52165
	10	-1708	-1142	-436	68	621	10596	13498	16479	20584	23835
	15	-2250	-1659	-920	-393	110	6691	8576	10511	13173	15281
	20	-2606	-1997	-1237	-694	-178	4810	6203	7632	9598	11154
	25	-2862	-2240	-1465	-911	-384	3709	4812	5943	7498	8729
	30	-3056	-2426	-1638	-1076	-541	2988	3900	4835	6121	7137
	35	-3210	-2572	-1775	-1207	-665	2482	3259	4055	5149	6014
	40	-3335	-2691	-1887	-1313	-766	2108	2784	3477	4429	5181
20	5	-508	-132	371	876	1627	16845	21172	25560	31511	36154
	10	-1232	-830	-320	50	459	7611	9615	11645	14391	16531
	15	-1613	-1197	-670	-288	81	4810	6114	7434	9219	10608
	20	-1861	-1436	-897	-507	-131	3461	4426	5403	6723	7750
	25	-2037	-1606	-1060	-664	-282	2670	3436	4210	5256	6070
	30	-2171	-1735	-1183	-782	-396	2153	2787	3428	4294	4967
	35	-2277	-1837	-1280	-876	-486	1789	2331	2877	3615	4189
	40	-2362	-1919	-1358	-951	-559	1521	1993	2469	3111	3611

TABLE F($s = 2$) (Continued)

n= 35		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
25	5	-400	-104	295	695	1291	13132	16427	19740	24189	27627
	10	-963	-651	-252	40	364	5936	7464	8997	11052	12637
	15	-1257	-936	-527	-227	65	3754	4749	5747	7083	8114
	20	-1446	-1121	-704	-399	-103	2702	3440	4179	5168	5931
	25	-1581	-1252	-830	-522	-222	2086	2671	3258	4043	4648
	30	-1683	-1351	-925	-614	-312	1682	2168	2654	3304	3805
	35	-1763	-1428	-1000	-687	-383	1399	1813	2228	2783	3210
	40	-1828	-1491	-1061	-748	-440	1189	1551	1913	2396	2768
30	5	-330	-86	244	576	1070	10759	13417	16074	19820	22343
	10	-791	-536	-208	33	301	4865	6098	7329	8967	10222
	15	-1029	-769	-434	-188	53	3077	3881	4683	5749	6566
	20	-1183	-919	-579	-329	-85	2216	2812	3406	4196	4801
	25	-1292	-1025	-682	-430	-184	1711	2185	2656	3283	3763
	30	-1374	-1105	-760	-506	-258	1380	1773	2164	2684	3082
	35	-1438	-1168	-821	-565	-316	1148	1484	1818	2261	2600
	40	-1491	-1219	-870	-613	-363	976	1269	1561	1947	2243
35	5	-281	-73	208	492	913	9112	11338	13555	16499	18750
	10	-671	-455	-177	28	257	4121	5155	6182	7542	8580
	15	-872	-652	-369	-160	46	2607	3282	3951	4837	5512
	20	-1001	-779	-492	-280	-73	1878	2378	2874	3531	4032
	25	-1092	-868	-579	-366	-156	1450	1848	2242	2764	3161
	30	-1161	-935	-645	-430	-219	1170	1500	1827	2260	2589
	35	-1215	-988	-696	-480	-269	974	1256	1535	1904	2185
	40	-1258	-1031	-738	-521	-309	828	1074	1318	1640	1885

TABLE F($s = 2$) (Continued)

n= 40		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
3	5	-4213	-50	4610	9527	17294	353320	551694	831437	1385724	2010043
	10	-17105	-9166	-2122	1501	5486	157566	246943	372960	622832	903840
	15	-27605	-16591	-6817	-1892	1709	98209	154562	234007	391400	568670
	20	-36335	-22763	-10721	-4652	-361	69687	110151	167188	280180	407438
	25	-43709	-27978	-14019	-6984	-2010	53046	84218	128151	215177	313189
	30	-50021	-32441	-16842	-8980	-3421	42215	67321	102700	172777	251698
	35	-55485	-36305	-19286	-10708	-4643	34648	55504	84887	143085	208625
	40	-60262	-39683	-21422	-12219	-5711	29094	46817	71784	121228	176910
4	5	-2641	-34	3155	6525	11762	183485	262788	362082	533392	702262
	10	-9440	-5430	-1369	1015	3722	82340	118416	163570	241455	318221
	15	-14182	-9194	-4142	-1224	1154	51658	74642	103404	153007	201898
	20	-17793	-12059	-6253	-2900	-239	36893	53566	74425	110395	145844
	25	-20669	-14342	-7935	-4235	-1298	28260	41232	57456	85431	112999
	30	-23027	-16213	-9314	-5330	-2167	22627	33174	46362	69100	91505
	35	-25002	-17781	-10469	-6247	-2895	18660	27521	38574	57626	76400
	40	-26684	-19116	-11453	-7027	-3515	15773	23353	32825	49152	65238
5	5	-1922	-25	2400	4967	8924	121799	167445	221233	307763	387474
	10	-6464	-3844	-1010	767	2819	54832	75707	100291	139822	176230
	15	-9392	-6307	-2968	-905	872	34514	47689	63637	88955	112270
	20	-11525	-8101	-4395	-2105	-179	24728	34485	45969	64428	81426
	25	-13175	-9488	-5498	-3032	-959	19001	26632	35611	50043	63330
	30	-14499	-10601	-6384	-3777	-1585	15258	21495	28831	40619	51472
	35	-15590	-11519	-7113	-4390	-2101	12632	17886	24063	33988	43124
	40	-16507	-12290	-7726	-4906	-2534	10696	15221	20539	29082	36946
10	5	-813	-11	1094	2269	4053	44335	57136	70728	90137	108062
	10	-2481	-1555	-437	345	1276	20068	25978	32243	41181	48508
	15	-3422	-2428	-1225	-393	392	12701	16529	20584	26367	31107
	20	-4060	-3018	-1758	-886	-79	9149	11969	14957	19216	22705
	25	-4529	-3452	-2150	-1249	-415	7066	9293	11652	15013	17767
	30	-4892	-3788	-2454	-1530	-676	5702	7539	9484	12254	14523
	35	-5183	-4058	-2697	-1756	-884	4743	6304	7956	10308	12235
	40	-5423	-4279	-2897	-1941	-1056	4034	5390	6823	8865	10536
15	5	-515	-7	709	1471	2623	26942	34115	41500	51685	59761
	10	-1531	-974	-279	223	825	12214	15535	18948	23648	27369
	15	-2083	-1499	-771	-251	253	7743	9901	12117	15167	17582
	20	-2449	-1848	-1097	-561	-51	5586	7181	8819	11072	12856
	25	-2714	-2100	-1334	-786	-265	4320	5584	6881	8665	10076
	30	-2918	-2294	-1515	-959	-429	3491	4537	5609	7083	8249
	35	-3080	-2448	-1659	-1096	-560	2908	3799	4712	5967	6960
	40	-3212	-2574	-1777	-1208	-667	2476	3252	4046	5138	6002
20	5	-377	-5	524	1088	1940	19332	24279	29298	36104	41414
	10	-1107	-709	-205	165	610	8771	11065	13386	16529	18978
	15	-1496	-1084	-562	-184	187	5564	7057	8567	10611	12202
	20	-1752	-1331	-797	-410	-37	4017	5123	6240	7752	8929
	25	-1936	-1508	-966	-573	-195	3109	3986	4872	6071	7003
	30	-2076	-1643	-1095	-698	-315	2514	3241	3974	4966	5738
	35	-2187	-1751	-1198	-796	-410	2095	2715	3341	4186	4844
	40	-2278	-1838	-1281	-877	-487	1785	2326	2871	3607	4180

TABLE F($s = 2$) (Continued)

n= 40		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
25	5	-297	-4	416	864	1539	15070	18837	22625	27712	31644
	10	-866	-557	-162	130	483	6840	8588	10342	12692	14505
	15	-1167	-849	-443	-145	148	4341	5480	6622	8151	9330
	20	-1363	-1039	-626	-323	-30	3136	3980	4825	5958	6831
	25	-1504	-1176	-758	-451	-154	2428	3098	3769	4668	5360
	30	-1611	-1280	-858	-549	-248	1964	2520	3076	3820	4393
	35	-1695	-1362	-937	-625	-323	1637	2112	2586	3221	3710
	40	-1764	-1429	-1001	-688	-384	1396	1810	2223	2777	3203
30	5	-245	-3	345	716	1275	12346	15385	18423	22477	25590
	10	-712	-459	-134	108	400	5605	7016	8423	10297	11733
	15	-957	-698	-365	-120	123	3559	4478	5395	6615	7549
	20	-1115	-853	-515	-267	-24	2571	3253	3933	4836	5528
	25	-1229	-964	-623	-372	-127	1991	2533	3073	3790	4340
	30	-1316	-1048	-705	-452	-205	1611	2061	2508	3103	3558
	35	-1384	-1115	-769	-515	-267	1344	1728	2110	2617	3005
	40	-1439	-1169	-822	-566	-316	1145	1481	1814	2256	2595
35	5	-209	-3	294	611	1089	10456	13001	15535	18901	21475
	10	-604	-390	-114	92	342	4748	5930	7104	8660	9847
	15	-810	-592	-311	-102	105	3015	3786	4551	5565	6338
	20	-944	-723	-438	-227	-21	2179	2751	3318	4069	4642
	25	-1039	-817	-529	-318	-108	1688	2142	2593	3190	3645
	30	-1112	-888	-598	-384	-175	1366	1743	2117	2612	2989
	35	-1169	-943	-652	-438	-227	1139	1462	1781	2203	2525
	40	-1215	-989	-697	-481	-269	971	1253	1532	1900	2181
40	5	-182	-3	257	533	950	9067	11256	13429	16306	18498
	10	-525	-339	-99	80	298	4118	5135	6142	7472	8483
	15	-703	-514	-270	-89	91	2615	3279	3935	4802	5460
	20	-818	-627	-381	-198	-18	1890	2383	2870	3512	4000
	25	-900	-708	-460	-275	-94	1464	1856	2243	2753	3141
	30	-963	-769	-519	-334	-152	1185	1510	1831	2255	2576
	35	-1012	-818	-566	-380	-197	989	1266	1541	1902	2177
	40	-1052	-857	-605	-418	-234	843	1086	1325	1641	1880

TABLE F($s = 2$) (Continued)

n= 50		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
3	5	-1605	1906	7137	13141	22807	445666	695397	1047564	1745358	2531316
	10	-12549	-5945	-84	3394	8144	200683	314023	473832	790459	1147080
	15	-21774	-12468	-4210	-48	3524	126204	198129	299534	500437	726714
	20	-29667	-18049	-7740	-2544	1176	90289	142230	215453	360516	523898
	25	-36499	-22880	-10795	-4704	-398	69249	109466	166156	278459	404942
	30	-42471	-27102	-13466	-6593	-1733	55494	88032	133893	224741	327056
	35	-47735	-30825	-15820	-8257	-2910	45842	72981	111226	186984	272302
	40	-52411	-34131	-17911	-9736	-3956	38725	61872	94488	159090	231844
4	5	-1043	1295	4903	9015	15521	231180	330822	455585	670836	883024
	10	-7196	-3648	-56	2310	5531	104611	150174	207205	305579	402541
	15	-11613	-7154	-2639	-32	2388	66132	95289	131778	194714	256744
	20	-15059	-8889	-4654	-1631	792	47560	68792	95360	141178	186334
	25	-17859	-12112	-6292	-2931	-263	36666	53240	73975	109733	144972
	30	-20196	-13966	-7659	-4016	-1124	29531	43048	59955	89107	117835
	35	-22183	-15544	-8821	-4938	-1856	24515	35875	50082	74576	98714
	40	-23898	-16905	-9824	-5734	-2488	20807	30569	42774	63815	84548
5	5	-773	981	3738	6869	11779	153368	210658	278169	386775	486823
	10	-5016	-2627	-42	1752	4192	69575	95879	126859	176677	222559
	15	-7825	-4989	-1921	-24	1807	44099	61010	80923	112939	142424
	20	-9917	-6748	-3319	-1200	598	31798	44169	58733	82146	103707
	25	-11564	-8133	-4420	-2126	-197	24577	34277	45694	64046	80944
	30	-12906	-9262	-5318	-2881	-832	19844	27789	37137	52162	65995
	35	-14028	-10205	-6069	-3512	-1362	16513	23218	31105	43781	55450
	40	-14982	-11007	-6707	-4049	-1813	14048	19833	26635	37566	47628
10	5	-336	443	1711	3143	5353	55769	71802	88825	113135	133081
	10	-1980	-1092	-19	794	1900	25408	32823	40686	51901	61096
	15	-2929	-1971	-812	-11	816	16177	20986	26082	33350	39307
	20	-3583	-2576	-1359	-517	268	11716	15264	19023	24382	28774
	25	-4071	-3028	-1767	-895	-87	9094	11898	14869	19103	22573
	30	-4454	-3382	-2087	-1191	-361	7373	9688	12139	15632	18494
	35	-4764	-3670	-2347	-1431	-584	6160	8128	10212	13180	15612
	40	-5022	-3908	-2562	-1631	-769	5260	6971	8781	11359	13470
15	5	-215	287	1110	2039	3466	33880	42858	52101	64848	74957
	10	-1232	-689	-12	514	1229	15455	19616	23893	29782	34446
	15	-1796	-1226	-515	-7	527	9853	12559	15338	19164	22194
	20	-2176	-1587	-853	-329	173	7145	9146	11202	14030	16269
	25	-2455	-1854	-1103	-566	-56	5553	7139	8768	11008	12781
	30	-2672	-2060	-1296	-750	-231	4507	5820	7167	9019	10486
	35	-2846	-2226	-1451	-898	-372	3770	4888	6036	7614	8863
	40	-2990	-2363	-1579	-1020	-488	3223	4197	5196	6569	7656
20	5	-158	212	821	1509	2563	24307	30497	36776	45291	51935
	10	-894	-503	-9	380	908	11095	13967	16874	20810	23876
	15	-1294	-889	-377	-5	390	7077	8947	10840	13400	15394
	20	-1561	-1147	-622	-241	128	5135	6520	7922	9817	11292
	25	-1756	-1335	-801	-414	-41	3993	5092	6204	7707	8877
	30	-1906	-1480	-939	-547	-170	3243	4154	5074	6318	7287
	35	-2027	-1596	-1050	-654	-273	2714	3491	4276	5337	6163
	40	-2126	-1691	-1141	-742	-357	2321	2999	3683	4607	5327

TABLE F($s = 2$) (Continued)

n= 50		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
25	5	-125	168	652	1198	2033	18946	23659	28397	34761	39679
	10	-701	-396	-7	301	720	8651	10839	13034	15976	18246
	15	-1011	-698	-297	-4	309	5521	6946	8376	10291	11768
	20	-1217	-897	-489	-191	101	4007	5064	6123	7542	8636
	25	-1366	-1043	-629	-327	-33	3117	3956	4797	5923	6791
	30	-1481	-1154	-737	-431	-134	2532	3228	3925	4858	5577
	35	-1573	-1244	-823	-514	-215	2120	2714	3309	4105	4718
	40	-1649	-1317	-893	-583	-282	1814	2332	2851	3545	4079
30	5	-103	139	541	993	1685	15521	19322	23122	28192	32086
	10	-577	-327	-6	249	597	7089	8854	10615	12959	14756
	15	-830	-574	-245	-3	256	4525	5675	6823	8350	9520
	20	-997	-737	-403	-158	84	3285	4138	4989	6121	6988
	25	-1118	-856	-518	-269	-27	2556	3234	3910	4808	5496
	30	-1211	-946	-606	-355	-111	2077	2639	3199	3944	4515
	35	-1285	-1019	-676	-424	-178	1739	2219	2698	3333	3820
	40	-1346	-1078	-734	-480	-233	1488	1907	2325	2879	3304
35	5	-88	119	462	848	1438	13144	16327	19496	23706	26925
	10	-490	-278	-5	213	510	6004	7483	8952	10898	12384
	15	-704	-488	-209	-3	218	3833	4797	5755	7023	7991
	20	-844	-625	-343	-134	71	2783	3499	4209	5149	5866
	25	-946	-725	-440	-229	-23	2166	2735	3299	4046	4615
	30	-1024	-802	-515	-302	-94	1760	2232	2700	3319	3791
	35	-1086	-863	-574	-360	-151	1474	1877	2277	2806	3209
	40	-1137	-913	-622	-408	-198	1261	1614	1962	2424	2775
40	5	-77	104	403	740	1255	11398	14135	16853	20450	23191
	10	-426	-242	-4	186	444	5207	6479	7739	9402	10667
	15	-611	-424	-182	-2	190	3325	4154	4976	6060	6884
	20	-732	-543	-298	-117	62	2414	3030	3640	4444	5055
	25	-820	-629	-383	-200	-20	1879	2369	2853	3492	3977
	30	-887	-695	-447	-263	-82	1527	1934	2335	2865	3268
	35	-941	-748	-498	-314	-132	1279	1626	1970	2422	2766
	40	-985	-791	-540	-355	-172	1095	1398	1698	2093	2392
45	5	-68	92	357	656	1113	10061	12462	14840	17979	20365
	10	-377	-214	-4	165	394	4597	5712	6815	8267	9368
	15	-540	-375	-161	-2	169	2935	3663	4382	5329	6046
	20	-646	-480	-264	-104	55	2132	2672	3206	3908	4440
	25	-724	-556	-338	-177	-18	1659	2089	2513	3071	3494
	30	-783	-614	-395	-233	-73	1349	1705	2057	2520	2871
	35	-830	-660	-441	-277	-117	1130	1435	1735	2131	2430
	40	-868	-698	-478	-314	-153	967	1233	1496	1841	2102
50	5	-61	82	321	590	1000	9005	11143	13256	16041	18152
	10	-337	-192	-3	148	354	4115	5108	6088	7376	8350
	15	-483	-336	-144	-2	152	2628	3276	3915	4755	5390
	20	-579	-430	-237	-93	50	1908	2390	2864	3487	3958
	25	-647	-498	-303	-159	-16	1485	1868	2246	2741	3115
	30	-700	-550	-354	-209	-65	1208	1526	1838	2249	2560
	35	-742	-591	-395	-249	-105	1011	1283	1551	1902	2167
	40	-776	-625	-428	-281	-137	866	1103	1337	1643	1875

TABLE F($s = 2$) (Continued)

n= 60		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
3	5	194	3597	9597	16722	28303	538049	839156	1263777	2105131	3052789
	10	-9305	-3650	1423	5194	10777	243882	381225	574882	958574	1390734
	15	-17509	-9452	-2302	1357	5291	154318	241872	365316	609887	885349
	20	-24678	-14521	-5508	-966	2553	111041	174529	264035	441362	641084
	25	-30996	-18989	-8334	-2964	852	85623	134965	204522	342321	497521
	30	-36608	-22957	-10844	-4739	-422	68961	109018	165480	277334	403310
	35	-41625	-26505	-13088	-6325	-1544	57236	90748	137981	231547	336925
	40	-46138	-29696	-15106	-7753	-2553	48564	77227	117622	197638	287754
4	5	130	2462	6608	11484	19269	278893	398882	549122	808329	1063847
	10	-5504	-2305	963	3545	7324	126920	181983	250906	369795	486980
	15	-9633	-5583	-1481	917	3590	80658	116005	160244	236548	311755
	20	-12910	-8184	-3398	-634	1728	58293	84104	116405	172114	227020
	25	-15615	-10331	-4980	-1889	573	45146	65345	90620	134207	177165
	30	-17902	-12146	-6317	-2951	-279	36517	53027	73682	109299	144402
	35	-19870	-13708	-7468	-3865	-1004	30436	44340	61732	91722	121276
	40	-21587	-15071	-8472	-4661	-1637	25931	37900	52870	78680	104114
5	5	98	1873	5044	8756	14627	184949	253887	335124	465812	586202
	10	-3894	-1684	728	2693	5553	84341	116080	153463	213579	268946
	15	-6586	-3947	-1092	692	2719	53717	74171	98258	136988	172655
	20	-8622	-5659	-2453	-472	1306	38908	53902	71556	99941	126079
	25	-10247	-7026	-3540	-1386	432	30198	41977	55843	78134	98661
	30	-11589	-8154	-4437	-2140	-209	24478	34141	45514	63796	80629
	35	-12721	-9106	-5195	-2777	-744	20444	28611	38222	53669	67891
	40	-13694	-9924	-5845	-3324	-1204	17454	24509	32809	46148	58429
10	5	43	853	2315	4011	6651	67206	86472	106926	136138	160105
	10	-1574	-716	328	1225	2519	30756	39677	49137	62632	73695
	15	-2522	-1593	-471	312	1230	19862	25454	31592	40347	47523
	20	-3183	-2206	-1024	-207	589	14295	18571	23103	29564	34860
	25	-3682	-2668	-1442	-594	194	11135	14518	18102	23212	27399
	30	-4078	-3035	-1773	-900	-92	9058	11852	14812	19030	22487
	35	-4402	-3334	-2043	-1151	-324	7591	9968	12485	16073	19012
	40	-4672	-3585	-2270	-1360	-518	6502	8569	10756	13873	16427
15	5	28	553	1503	2603	4307	40820	51604	62705	78015	90156
	10	-985	-455	212	793	1630	18700	23702	28842	35921	41528
	15	-1555	-997	-300	201	795	11968	15223	18566	23168	26812
	20	-1944	-1367	-647	-133	380	8710	11119	13593	16997	19692
	25	-2233	-1642	-905	-378	125	6792	8702	10662	13360	15496
	30	-2459	-1857	-1106	-570	-59	5531	7111	8734	10966	12732
	35	-2643	-2032	-1270	-725	-207	4640	5987	7370	9272	10777
	40	-2795	-2177	-1405	-854	-330	3978	5152	6356	8011	9321
20	5	21	409	1113	1927	3185	29283	36716	44255	54481	62459
	10	-717	-333	156	587	1205	13422	16872	20365	25094	28778
	15	-1124	-725	-221	148	588	8594	10842	13116	16194	18591
	20	-1398	-990	-473	-98	281	6258	7923	9608	11887	13662
	25	-1601	-1186	-659	-277	92	4882	6204	7541	9349	10757
	30	-1759	-1338	-804	-417	-44	3977	5073	6180	7677	8843
	35	-1886	-1460	-921	-529	-152	3338	4273	5217	6495	7489
	40	-1991	-1562	-1017	-623	-242	2863	3678	4502	5614	6481

TABLE F($s = 2$) (Continued)

n= 60		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
25	5	16	324	883	1530	2527	22824	28482	34171	41811	47716
	10	-563	-263	124	465	956	10464	13092	15728	19262	21989
	15	-880	-570	-174	118	466	6703	8415	10133	12435	14210
	20	-1092	-776	-372	-77	223	4882	6152	7425	9131	10445
	25	-1248	-927	-518	-219	73	3810	4818	5829	7183	8227
	30	-1369	-1045	-631	-329	-34	3105	3941	4779	5901	6765
	35	-1466	-1139	-722	-417	-120	2606	3320	4036	4993	5731
	40	-1546	-1217	-797	-490	-191	2236	2859	3483	4318	4961
30	5	14	269	732	1268	2094	18697	23260	27821	33908	38583
	10	-464	-217	103	386	792	8574	10693	12808	15624	17782
	15	-723	-470	-144	97	386	5493	6875	8253	10088	11493
	20	-895	-638	-307	-64	184	4002	5027	6049	7409	8451
	25	-1022	-762	-427	-181	60	3123	3938	4750	5830	6657
	30	-1120	-857	-520	-271	-29	2546	3221	3895	4790	5476
	35	-1199	-934	-594	-344	-99	2138	2715	3290	4054	4639
	40	-1263	-997	-655	-404	-158	1834	2338	2839	3506	4017
35	5	12	229	626	1083	1788	15833	19654	23459	28512	32376
	10	-395	-185	88	329	676	7261	9037	10801	13138	14922
	15	-613	-399	-123	83	330	4653	5811	6961	8484	9646
	20	-759	-542	-261	-54	157	3390	4249	5102	6232	7094
	25	-865	-646	-363	-154	52	2646	3329	4007	4905	5589
	30	-948	-727	-442	-231	-24	2157	2724	3286	4030	4598
	35	-1014	-791	-504	-293	-85	1812	2296	2776	3412	3896
	40	-1068	-845	-556	-343	-135	1555	1977	2396	2951	3373
40	5	10	200	546	945	1560	13729	17015	20277	24595	27886
	10	-343	-161	76	287	590	6297	7824	9337	11334	12853
	15	-533	-347	-107	72	287	4035	5032	6018	7320	8310
	20	-658	-471	-228	-47	137	2941	3680	4412	5378	6111
	25	-750	-561	-316	-134	45	2296	2884	3465	4233	4816
	30	-821	-631	-384	-201	-21	1872	2359	2842	3478	3962
	35	-878	-687	-438	-255	-74	1572	1989	2401	2945	3358
	40	-925	-733	-483	-299	-117	1349	1713	2073	2547	2908
45	5	9	177	484	838	1383	12119	15001	17855	21623	24487
	10	-303	-142	68	255	523	5559	6898	8222	9965	11287
	15	-471	-307	-95	64	255	3563	4437	5300	6436	7298
	20	-582	-416	-201	-42	122	2596	3245	3886	4729	5368
	25	-662	-496	-279	-119	40	2027	2543	3052	3722	4230
	30	-725	-557	-339	-178	-19	1653	2081	2503	3059	3480
	35	-775	-606	-388	-225	-65	1388	1754	2115	2590	2950
	40	-816	-647	-427	-264	-104	1192	1511	1826	2241	2555
50	5	8	159	435	753	1243	10847	13413	15949	19291	21826
	10	-272	-128	61	229	470	4976	6168	7345	8891	10061
	15	-422	-275	-85	58	229	3189	3967	4735	5743	6505
	20	-521	-373	-181	-38	109	2324	2902	3472	4220	4785
	25	-593	-444	-251	-107	36	1815	2274	2727	3322	3771
	30	-648	-499	-304	-160	-17	1480	1861	2237	2730	3103
	35	-693	-543	-347	-202	-59	1243	1569	1890	2311	2630
	40	-730	-579	-383	-237	-93	1067	1352	1632	2000	2278

TABLE F($s = 2$) (Continued)

n= 60		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
55	5	7	145	395	684	1128	9816	12128	14411	17413	19686
	10	-247	-116	55	208	426	4503	5578	6637	8025	9075
	15	-382	-249	-77	52	208	2886	3588	4279	5184	5868
	20	-471	-338	-164	-34	99	2104	2625	3137	3809	4317
	25	-536	-402	-227	-97	32	1643	2057	2465	2999	3402
	30	-587	-452	-276	-145	-15	1339	1683	2022	2465	2799
	35	-627	-491	-315	-183	-53	1125	1419	1708	2087	2373
	40	-660	-524	-347	-215	-85	966	1223	1475	1806	2055
60	5	7	133	362	626	1033	8964	11069	13143	15868	17928
	10	-225	-106	51	190	390	4113	5091	6053	7313	8264
	15	-349	-228	-70	48	190	2636	3275	3902	4724	5344
	20	-431	-309	-150	-31	91	1921	2396	2862	3472	3931
	25	-490	-367	-208	-88	30	1500	1878	2248	2733	3099
	30	-536	-413	-252	-132	-14	1223	1537	1844	2247	2550
	35	-572	-449	-288	-168	-49	1028	1296	1558	1902	2161
	40	-602	-478	-317	-196	-77	882	1116	1346	1646	1872

TABLE F($s = 2$) (Continued)

n= 60		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
3	5	2799	6724	14421	23831	39267	722870	1126761	1696329	2824886	4096036
	10	-4991	-600	4010	8682	16005	330401	515813	777253	1295247	1878676
	15	-11687	-5335	302	3825	8768	210732	329633	497280	829435	1203545
	20	-17707	-9592	-2391	1287	5197	152782	239476	361706	603873	876625
	25	-23150	-13440	-4825	-483	3045	118655	186376	281850	471003	684044
	30	-28095	-16937	-7036	-2047	1579	96214	151450	229320	383589	557339
	35	-32608	-20128	-9055	-3474	477	80368	126782	192209	321826	467810
	40	-36743	-23052	-10904	-4781	-452	68608	108466	164650	275951	401304
4	5	1912	4634	9956	16388	26749	374348	535040	736246	1083386	1425586
	10	-3098	-396	2741	5944	10885	171595	245677	338411	498373	656043
	15	-6755	-3298	202	2606	5956	109795	157550	217322	320420	422039
	20	-9727	-5657	-1536	869	3526	79863	114867	158676	234238	308713
	25	-12232	-7646	-3002	-319	2062	62228	89717	124116	183445	241920
	30	-14392	-9360	-4264	-1322	1066	50625	73163	101366	150004	197941
	35	-16282	-10860	-5370	-2199	320	42425	61461	85279	126354	166835
	40	-17956	-12189	-6349	-2976	-299	36333	52764	73320	108768	143701
5	5	1452	3538	7612	12505	20312	248129	340368	449063	623924	785006
	10	-2244	-296	2084	4524	8258	113908	156528	206728	287457	361809
	15	-4726	-2383	152	1977	4514	73004	100558	133008	185187	233243
	20	-6645	-3997	-1131	656	2670	53190	73447	97301	135655	170976
	25	-8207	-5310	-2176	-239	1560	41514	57468	76253	106455	134267
	30	-9518	-6413	-3052	-976	805	33829	46948	62392	87222	110087
	35	-10642	-7357	-3804	-1608	240	28395	39507	52587	73614	92976
	40	-11620	-8180	-4458	-2158	-223	24357	33974	45294	63489	80243
10	5	660	1624	3503	5738	9242	90088	115819	143138	182152	214163
	10	-941	-130	949	2065	3750	41463	53398	66054	84109	98911
	15	-1877	-997	68	897	2047	26649	34407	42632	54364	63979
	20	-2542	-1612	-488	295	1208	19471	25207	31287	39956	47062
	25	-3052	-2084	-914	-105	704	15239	19782	24596	31459	37085
	30	-3461	-2463	-1257	-422	362	12452	16208	20186	25859	30508
	35	-3800	-2777	-1540	-685	107	10481	13678	17065	21893	25850
	40	-4087	-3043	-1780	-907	-99	9014	11795	14741	18940	22381
15	5	427	1054	2277	3725	5986	54704	69098	83916	104352	120559
	10	-595	-84	614	1339	2427	25197	31880	38749	48209	55701
	15	-1189	-630	44	581	1324	16208	20560	25032	31188	36062
	20	-1567	-1008	-311	190	781	11852	15075	18386	22944	26552
	25	-1867	-1294	-579	-68	455	9284	11841	14467	18081	20943
	30	-2105	-1521	-791	-270	233	7592	9709	11884	14876	17244
	35	-2301	-1706	-965	-435	69	6395	8201	10055	12605	14625
	40	-2464	-1862	-1111	-574	-63	5504	7077	8692	10914	12673
20	5	316	781	1686	2758	4427	39238	49157	59218	72863	83509
	10	-435	-62	454	990	1795	18080	22687	27352	33668	38589
	15	-849	-460	32	429	979	11634	14637	17677	21790	24994
	20	-1132	-734	-228	141	577	8511	10737	12990	16037	18411
	25	-1345	-938	-423	-50	336	6669	8437	10225	12644	14527
	30	-1512	-1099	-577	-198	172	5456	6921	8402	10407	11967
	35	-1648	-1231	-702	-319	51	4597	5848	7112	8822	10153
	40	-1762	-1341	-807	-420	-47	3958	5048	6151	7641	8802

TABLE F($s = 2$) (Continued)

n= 80		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
25	5	251	620	1339	2190	3512	30580	38129	45720	55914	63792
	10	-343	-49	360	786	1423	14094	17601	21121	25839	29479
	15	-666	-383	25	340	776	9071	11359	13653	16727	19098
	20	-886	-576	-180	111	458	6638	8334	10035	12314	14072
	25	-1050	-736	-334	-39	266	5202	6550	7901	9711	11106
	30	-1179	-861	-454	-156	137	4257	5374	6495	7995	9151
	35	-1284	-963	-552	-252	40	3588	4542	5498	6779	7766
	40	-1371	-1048	-634	-331	-37	3090	3922	4756	5873	6734
30	5	208	514	1111	1816	2911	25050	31137	37222	45343	51579
	10	-283	-40	299	651	1180	11546	14375	17197	20956	23836
	15	-548	-299	21	282	643	7433	9278	11119	13568	15445
	20	-728	-475	-149	92	379	5440	6809	8174	9990	11382
	25	-862	-605	-275	-33	221	4264	5352	6436	7879	8985
	30	-966	-707	-374	-129	113	3490	4392	5291	6488	7404
	35	-1051	-790	-455	-208	33	2941	3712	4480	5502	6284
	40	-1122	-859	-522	-273	-31	2533	3206	3876	4767	5450
35	5	177	439	949	1551	2485	21212	26309	31384	38126	43280
	10	-241	-34	255	556	1007	9778	12147	14501	17621	20002
	15	-466	-255	18	241	549	6295	7841	9376	11410	12962
	20	-618	-404	-127	79	324	4608	5755	6894	8402	9553
	25	-730	-514	-234	-28	188	3612	4524	5429	6628	7542
	30	-819	-600	-318	-110	97	2957	3713	4464	5458	6216
	35	-890	-670	-387	-177	29	2492	3139	3780	4629	5276
	40	-950	-729	-443	-233	-26	2147	2711	3271	4012	4576
40	5	155	383	828	1353	2168	18393	22776	27127	32887	37276
	10	-210	-30	222	485	879	8480	10517	12535	15200	17227
	15	-405	-222	16	210	479	5460	6789	8106	9844	11165
	20	-537	-351	-111	69	282	3996	4983	5960	7249	8229
	25	-634	-447	-204	-24	164	3133	3918	4694	5719	6497
	30	-710	-521	-277	-96	84	2565	3216	3860	4710	5355
	35	-772	-582	-336	-154	25	2162	2718	3269	3995	4546
	40	-823	-632	-385	-202	-23	1863	2348	2829	3462	3943
45	5	137	340	734	1201	1923	16236	20079	23886	28913	32733
	10	-186	-27	197	430	779	7485	9272	11038	13364	15128
	15	-358	-196	14	186	425	4820	5986	7138	8655	9804
	20	-474	-310	-98	61	250	3528	4394	5249	6374	7227
	25	-560	-395	-181	-21	146	2766	3455	4134	5029	5707
	30	-627	-461	-245	-85	75	2264	2836	3400	4142	4704
	35	-681	-514	-297	-136	22	1909	2397	2879	3513	3994
	40	-726	-558	-341	-179	-20	1645	2071	2492	3045	3464
50	5	123	305	660	1079	1728	14531	17953	21337	25794	29175
	10	-167	-24	177	387	700	6700	8291	9860	11922	13484
	15	-321	-176	12	167	381	4314	5353	6377	7722	8739
	20	-425	-278	-88	55	225	3158	3929	4689	5687	6442
	25	-501	-354	-162	-19	131	2476	3090	3694	4487	5087
	30	-561	-413	-220	-76	67	2027	2536	3037	3696	4194
	35	-609	-460	-267	-122	20	1709	2144	2573	3135	3560
	40	-650	-500	-306	-161	-18	1473	1852	2226	2717	3089

TABLE F($s = 2$) (Continued)

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55	5	112	277	599	979	1568	13150	16234	19278	23282	26314
	10	-151	-22	161	351	635	6063	7497	8909	10762	12161
	15	-291	-160	11	152	346	3905	4841	5762	6970	7883
	20	-385	-252	-80	50	204	2858	3553	4237	5134	5811
	25	-454	-321	-147	-17	119	2241	2794	3338	4051	4589
	30	-508	-374	-199	-69	61	1835	2294	2745	3336	3783
	35	-552	-417	-242	-111	18	1547	1939	2325	2830	3212
	40	-588	-453	-277	-146	-16	1333	1675	2012	2453	2786
60	5	102	254	549	897	1436	12009	14815	17582	21216	23964
	10	-138	-20	147	321	582	5537	6842	8125	9807	11075
	15	-266	-146	10	139	317	3566	4418	5255	6352	7179
	20	-351	-231	-73	45	187	2611	3243	3865	4679	5292
	25	-415	-293	-134	-16	109	2047	2550	3045	3692	4179
	30	-464	-342	-182	-63	56	1676	2094	2504	3041	3446
	35	-504	-381	-221	-102	16	1413	1770	2121	2580	2926
	40	-537	-414	-253	-133	-15	1218	1529	1836	2236	2538
65	5	94	234	506	827	1324	11050	13624	16160	19486	21998
	10	-127	-18	136	296	536	5095	6292	7468	9007	10167
	15	-245	-135	10	128	292	3281	4063	4830	5834	6590
	20	-324	-212	-67	42	172	2402	2983	3552	4297	4859
	25	-382	-270	-124	-15	100	1884	2346	2799	3391	3837
	30	-427	-315	-168	-58	51	1542	1926	2302	2793	3163
	35	-463	-351	-204	-94	15	1300	1628	1950	2370	2686
	40	-494	-381	-233	-123	-14	1121	1407	1687	2054	2330
70	5	88	217	469	767	1228	10233	12611	14951	18017	20330
	10	-118	-17	126	275	498	4718	5824	6909	8328	9396
	15	-227	-125	9	119	271	3039	3761	4469	5394	6091
	20	-300	-197	-62	39	160	2225	2761	3287	3974	4490
	25	-353	-250	-115	-14	93	1745	2171	2589	3136	3546
	30	-395	-291	-156	-54	48	1428	1782	2130	2583	2924
	35	-429	-325	-189	-87	14	1204	1507	1804	2191	2483
	40	-457	-353	-216	-114	-13	1038	1302	1561	1900	2154
75	5	82	202	438	716	1146	9528	11737	13910	16754	18898
	10	-110	-16	118	256	464	4394	5421	6428	7744	8734
	15	-211	-116	8	111	253	2830	3500	4158	5016	5662
	20	-279	-183	-58	36	149	2072	2570	3058	3695	4174
	25	-329	-233	-107	-13	87	1625	2021	2409	2916	3297
	30	-368	-271	-145	-50	44	1330	1659	1982	2402	2718
	35	-400	-303	-176	-81	13	1122	1403	1679	2038	2308
	40	-426	-328	-201	-106	-12	966	1212	1453	1767	2002
80	5	77	190	410	670	1073	8914	10977	13004	15656	17653
	10	-103	-15	110	240	435	4111	5070	6010	7237	8159
	15	-198	-109	8	104	237	2647	3274	3887	4688	5289
	20	-261	-172	-54	34	140	1938	2404	2859	3453	3900
	25	-308	-218	-100	-12	81	1520	1890	2253	2725	3080
	30	-344	-254	-136	-47	42	1245	1552	1853	2245	2539
	35	-374	-283	-165	-76	12	1050	1312	1569	1905	2156
	40	-398	-307	-188	-99	-11	904	1134	1358	1651	1871

TABLE F($s = 2$) (Continued)

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3	5	5051	9710	19182	30903	50211	907727	1414421	2128964	3544779	5139482
	10	-2253	1384	6417	12099	21202	417002	650525	979805	1632217	2367045
	15	-7899	-2656	2162	6156	12207	267271	417580	629517	1049426	1522376
	20	-13070	-6313	-317	3147	7788	194688	304667	459732	766958	1112988
	25	-17824	-9675	-2443	1246	5143	151886	238080	359604	600371	871548
	30	-22211	-12777	-4405	-186	3368	123696	194218	293644	490625	712483
	35	-26272	-15648	-6221	-1470	2079	103756	163187	246973	412965	599919
	40	-30041	-18313	-7907	-2662	1083	88927	140106	212254	355187	516169
4	5	3475	6715	13264	21269	34217	469821	671224	923405	1358492	1787387
	10	-1450	937	4405	8297	14428	216310	309425	425985	627049	825233
	15	-4742	-1701	1469	4207	8298	138991	199172	274501	404435	532505
	20	-7459	-3858	-210	2141	5289	101508	145729	201076	296542	390635
	25	-9783	-5701	-1569	841	3489	79400	114205	157764	232894	306944
	30	-11811	-7311	-2755	-124	2281	64834	93432	129220	190948	251782
	35	-13607	-8737	-3806	-958	1406	54525	78727	109012	161244	212722
	40	-15216	-10014	-4746	-1704	730	46855	67783	93970	139130	183639
5	5	2651	5138	10150	16237	25988	311321	426864	563021	782061	983842
	10	-1069	709	3356	6321	10949	143501	197007	260031	361386	454735
	15	-3379	-1250	1113	3198	6293	92327	126990	167813	233460	293918
	20	-5189	-2772	-157	1623	4008	67518	93049	123115	171460	215983
	25	-6681	-4027	-1155	635	2642	52883	73026	96744	134881	170002
	30	-7948	-5092	-2002	-93	1726	43239	59828	79361	110766	139687
	35	-9045	-6015	-2736	-710	1062	36412	50484	67051	93687	118214
	40	-10010	-6827	-3382	-1253	550	31331	43527	57884	80966	102220
10	5	1214	2367	4680	7457	11830	112973	145170	179354	228173	268228
	10	-462	319	1535	2891	4976	52178	67127	82981	105598	124139
	15	-1381	-537	503	1457	2856	33646	43374	53686	68396	80453
	20	-2041	-1149	-70	735	1816	24662	31859	39488	50368	59286
	25	-2553	-1623	-498	286	1196	19360	25064	31109	39730	46795
	30	-2969	-2007	-845	-41	780	15865	20583	25583	32714	38557
	35	-3315	-2328	-1135	-309	479	13389	17409	21669	27741	32718
	40	-3611	-2602	-1382	-539	247	11546	15045	18751	24036	28366
15	5	788	1539	3043	4843	7663	68590	86594	105130	130692	150965
	10	-294	206	995	1875	3221	31697	40063	48661	60502	69881
	15	-867	-342	325	943	1848	20454	25904	31505	39216	45321
	20	-1268	-724	-45	476	1175	15002	19040	23190	28901	33423
	25	-1574	-1015	-317	184	773	11784	14990	18282	22814	26402
	30	-1819	-1248	-535	-26	504	9663	12319	15046	18799	21770
	35	-2021	-1440	-715	-198	309	8161	10426	12752	15953	18487
	40	-2192	-1603	-868	-343	159	7042	9016	11043	13832	16040
20	5	583	1140	2254	3587	5668	49194	61599	74182	91247	104562
	10	-216	152	737	1388	2382	22741	28506	34343	42246	48403
	15	-632	-251	240	698	1366	14679	18438	22242	27392	31402
	20	-920	-529	-33	351	868	10769	13557	16377	20194	23167
	25	-1137	-738	-233	136	571	8463	10676	12916	15947	18306
	30	-1310	-905	-392	-19	372	6941	8776	10633	13145	15100
	35	-1453	-1042	-522	-145	228	5864	7430	9015	11159	12827
	40	-1572	-1158	-632	-252	117	5061	6427	7809	9678	11133

TABLE F($s = 2$) (Continued)

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r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
25	5	463	905	1791	2848	4497	38339	47778	57270	70018	79869
	10	-171	121	585	1102	1890	17725	22113	26517	32419	36973
	15	-497	-198	191	554	1083	11444	14306	17177	21024	23991
	20	-721	-416	-26	279	689	8397	10521	12650	15503	17703
	25	-890	-580	-184	108	453	6600	8287	9978	12245	13992
	30	-1024	-710	-309	-15	295	5415	6814	8216	10095	11544
	35	-1133	-817	-411	-115	181	4575	5770	6967	8572	9808
	40	-1226	-906	-497	-199	93	3949	4992	6037	7436	8514
30	5	384	751	1485	2361	3727	31404	39015	46625	58779	64576
	10	-141	100	485	913	1566	14521	18059	21589	26290	29894
	15	-410	-164	158	459	898	9376	11684	13987	17052	19400
	20	-593	-343	-22	231	571	6881	8594	10302	12575	14317
	25	-731	-478	-152	89	375	5409	6770	8127	9934	11317
	30	-840	-584	-255	-13	244	4438	5567	6693	8191	9338
	35	-929	-671	-339	-95	150	3750	4715	5676	6956	7935
	40	-1004	-744	-410	-164	77	3238	4080	4919	6035	6889
35	5	328	641	1269	2017	3182	26592	32965	39311	47740	54185
	10	-120	85	414	780	1337	12297	15260	18204	22106	25083
	15	-348	-140	135	392	766	7941	9874	11794	14339	16279
	20	-504	-292	-18	197	487	5828	7263	8688	10576	12015
	25	-620	-406	-129	76	320	4581	5722	6855	8355	9499
	30	-712	-496	-217	-11	209	3759	4706	5645	6890	7838
	35	-787	-570	-289	-81	128	3177	3986	4788	5851	6661
	40	-850	-631	-349	-140	66	2743	3449	4149	5077	5784
40	5	286	560	1107	1760	2776	23058	28538	33978	41180	46668
	10	-105	74	361	680	1166	10663	13211	15735	19068	21603
	15	-303	-122	118	342	669	6886	8549	10196	12369	14022
	20	-438	-254	-16	172	425	5055	6289	7511	9124	10350
	25	-539	-353	-113	66	279	3974	4955	5926	7208	8182
	30	-618	-431	-189	-9	182	3261	4075	4881	5945	6753
	35	-683	-495	-251	-71	111	2756	3452	4140	5049	5739
	40	-737	-548	-303	-122	57	2380	2987	3588	4381	4983
45	5	254	496	982	1561	2462	20353	25159	29918	36203	40979
	10	-93	66	320	604	1034	9413	11647	13855	16764	18970
	15	-268	-108	104	303	593	6079	7537	8978	10875	12313
	20	-387	-225	-14	152	377	4462	5545	6614	8022	9089
	25	-476	-312	-100	59	248	3508	4369	5219	6338	7186
	30	-546	-381	-167	-8	161	2879	3593	4299	5227	5931
	35	-603	-437	-222	-63	99	2433	3044	3647	4440	5041
	40	-651	-484	-268	-108	51	2101	2634	3160	3853	4377
50	5	228	446	883	1403	2212	18216	22495	26724	32297	36524
	10	-83	59	288	542	929	8425	10414	12376	14955	16908
	15	-240	-97	94	272	533	5441	6740	8020	9702	10975
	20	-347	-202	-13	137	338	3994	4958	5909	7157	8102
	25	-427	-280	-90	53	222	3140	3907	4663	5655	6406
	30	-489	-342	-150	-8	145	2577	3214	3841	4664	5287
	35	-540	-392	-199	-56	89	2178	2722	3258	3962	4494
	40	-583	-434	-241	-97	46	1881	2356	2824	3438	3902

TABLE F($s = 2$) (Continued)

n= 100		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
55	5	207	405	801	1274	2008	16485	20340	24146	29152	32942
	10	-76	54	261	492	844	7624	9417	11182	13499	15249
	15	-218	-88	85	247	484	4924	6095	7247	8758	9899
	20	-314	-183	-12	124	307	3615	4484	5339	6461	7307
	25	-386	-254	-81	48	202	2842	3533	4213	5105	5778
	30	-443	-310	-136	-7	131	2333	2906	3471	4211	4769
	35	-489	-355	-181	-51	81	1972	2462	2944	3577	4054
	40	-527	-393	-218	-88	41	1703	2131	2552	3104	3520
60	5	189	371	734	1166	1839	15054	18563	22021	26564	30000
	10	-69	49	239	451	772	6963	8594	10199	12301	13887
	15	-199	-80	78	226	443	4497	5562	6609	7981	9015
	20	-287	-167	-11	114	281	3301	4092	4870	5888	6655
	25	-353	-232	-74	44	185	2596	3225	3843	4652	5262
	30	-404	-283	-125	-6	120	2130	2653	3166	3837	4344
	35	-446	-324	-165	-47	74	1801	2247	2686	3260	3692
	40	-482	-359	-199	-80	38	1555	1945	2328	2829	3206
65	5	175	342	677	1076	1695	13852	17070	20240	24398	27539
	10	-64	45	221	416	712	6407	7903	9374	11298	12748
	15	-184	-74	72	209	408	4138	5115	6075	7330	8276
	20	-265	-154	-10	105	259	3038	3764	4476	5408	6109
	25	-325	-214	-69	41	170	2389	2966	3532	4273	4831
	30	-372	-261	-115	-6	111	1960	2440	2910	3525	3988
	35	-411	-299	-152	-43	68	1657	2067	2469	2994	3390
	40	-443	-331	-184	-74	35	1431	1789	2140	2599	2944
70	5	162	317	628	998	1573	12827	15800	18725	22559	25451
	10	-59	42	205	386	661	5933	7315	8672	10446	11781
	15	-170	-69	67	194	379	3832	4735	5620	6778	7648
	20	-245	-143	-9	97	241	2813	3484	4141	5000	5646
	25	-301	-198	-64	38	158	2212	2745	3268	3951	4465
	30	-345	-241	-106	-5	103	1816	2258	2692	3259	3686
	35	-381	-277	-141	-40	63	1535	1913	2284	2769	3133
	40	-410	-306	-170	-69	32	1325	1656	1980	2403	2721
75	5	151	296	586	931	1467	11944	14706	17421	20977	23657
	10	-55	39	191	360	616	5524	6809	8068	9714	10951
	15	-159	-64	62	181	353	3568	4407	5229	6302	7109
	20	-229	-133	-8	91	224	2620	3243	3853	4650	5249
	25	-280	-185	-59	35	147	2060	2555	3041	3674	4151
	30	-321	-225	-99	-5	96	1691	2102	2505	3031	3426
	35	-354	-258	-132	-37	59	1429	1781	2125	2575	2912
	40	-382	-285	-159	-64	30	1234	1541	1842	2235	2529
80	5	142	277	549	872	1374	11174	13753	16287	19602	22100
	10	-52	37	179	337	577	5169	6368	7543	9077	10230
	15	-148	-60	58	169	331	3338	4122	4889	5890	6641
	20	-214	-125	-8	85	210	2451	3033	3602	4345	4903
	25	-262	-173	-55	33	138	1927	2390	2843	3434	3877
	30	-301	-211	-93	-5	90	1582	1966	2342	2832	3201
	35	-332	-241	-123	-35	55	1337	1666	1987	2406	2721
	40	-357	-267	-149	-60	28	1155	1442	1722	2088	2363

TABLE F($s = 2$) (Continued)

n= 100		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
85	5	133	261	516	820	1293	10498	12917	15292	18397	20734
	10	-48	35	168	317	543	4856	5981	7082	8519	9598
	15	-140	-56	55	159	311	3136	3871	4590	5527	6231
	20	-201	-117	-7	80	198	2303	2848	3382	4078	4600
	25	-247	-162	-52	31	130	1811	2245	2669	3223	3638
	30	-282	-198	-87	-4	85	1486	1847	2199	2658	3003
	35	-312	-227	-116	-33	52	1256	1564	1866	2258	2553
	40	-336	-251	-140	-56	27	1085	1354	1617	1960	2217
90	5	126	246	487	774	1220	9899	12176	14411	17331	19528
	10	-46	33	159	299	513	4579	5638	6674	8025	9039
	15	-132	-53	52	150	294	2957	3649	4326	5207	5869
	20	-190	-111	-7	76	187	2171	2685	3188	3842	4333
	25	-233	-153	-49	29	123	1707	2116	2516	3036	3426
	30	-266	-187	-82	-4	80	1401	1741	2073	2505	2828
	35	-294	-214	-109	-31	49	1185	1475	1758	2128	2405
	40	-317	-237	-132	-53	25	1023	1277	1524	1847	2088
95	5	119	233	462	733	1156	9364	11516	13626	16382	18454
	10	-43	31	150	283	485	4331	5332	6311	7586	8542
	15	-125	-50	49	142	278	2798	3451	4090	4922	5546
	20	-179	-105	-7	71	177	2054	2539	3014	3632	4095
	25	-220	-145	-47	28	116	1615	2001	2379	2870	3238
	30	-252	-177	-78	-4	76	1326	1646	1960	2367	2673
	35	-278	-202	-103	-29	46	1121	1395	1663	2011	2272
	40	-300	-224	-125	-50	24	968	1207	1441	1746	1974
100	5	113	221	438	696	1097	8884	10923	12922	15531	17492
	10	-41	29	143	269	461	4110	5058	5985	7192	8097
	15	-118	-48	46	135	264	2655	3274	3879	4667	5257
	20	-170	-99	-6	68	168	1949	2409	2858	3443	3881
	25	-209	-138	-44	26	110	1533	1898	2256	2721	3069
	30	-239	-168	-74	-4	72	1258	1562	1859	2245	2534
	35	-264	-192	-98	-28	44	1063	1323	1577	1907	2154
	40	-284	-212	-118	-48	23	919	1145	1367	1655	1871

H.2 TABLE F($s = 3$): Two-Parameter Exponential Quantiles for Future Samples

n= 5		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
3	5	-30825	-18868	-8257	-2910	877	63605	99342	149687	249394	361679
	10	-62627	-41355	-22480	-12967	-6240	21573	34412	52472	88216	128458
	15	-79345	-53176	-29956	-18253	-9978	11444	18670	28820	48894	71488
	20	-89564	-60403	-34526	-21485	-12263	7180	11988	18728	32048	47037
	25	-96443	-65266	-37603	-23660	-13801	4934	8436	13336	23011	33895
	30	-101384	-68760	-39812	-25223	-14906	3592	6293	10065	17507	25876
	35	-105104	-71391	-41476	-26399	-15738	2719	4889	7910	13866	20562
	40	-108006	-73442	-42774	-27317	-16387	2119	3912	6404	11312	16828
4	5	-15544	-10274	-4938	-1856	592	33204	47477	65307	96032	126301
	10	-27503	-19766	-11932	-7407	-3816	11641	17027	23736	35279	46643
	15	-33057	-24175	-15180	-9985	-5862	6346	9506	13433	20180	26818
	20	-36281	-26733	-17065	-11482	-7050	4071	6248	8945	13573	18123
	25	-38389	-28406	-18298	-12460	-7827	2850	4483	6501	9958	13354
	30	-39875	-29586	-19167	-13150	-8374	2108	3401	4993	7717	10392
	35	-40979	-30462	-19813	-13663	-8781	1619	2681	3984	6211	8397
	40	-41832	-31139	-20312	-14058	-9095	1277	2173	3270	5140	6975
5	5	-10205	-6990	-3512	-1362	447	22080	30263	39872	55300	69497
	10	-16949	-12662	-8022	-5155	-2744	7870	11040	14748	20687	26145
	15	-19891	-15135	-9989	-6809	-4134	4348	6251	8468	12014	15269
	20	-21554	-16533	-11101	-7744	-4921	2820	4155	5706	8180	10450
	25	-22626	-17435	-11818	-8347	-5428	1993	3010	4188	6063	7782
	30	-23374	-18064	-12319	-8768	-5782	1486	2302	3244	4740	6111
	35	-23927	-18529	-12688	-9079	-6043	1149	1828	2607	3845	4977
	40	-24352	-18886	-12973	-9318	-6244	911	1491	2154	3203	4163

TABLE F($s = 3$) (Continued)

n= 6		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
3	5	-24816	-14618	-5570	-1010	2348	78901	122897	184884	307655	445914
	10	-55465	-36291	-19277	-10702	-4639	27559	43670	66340	111218	161745
	15	-72717	-48490	-26992	-16157	-8496	14910	24070	36944	62414	91085
	20	-83644	-56216	-31879	-19613	-10939	9500	15631	24235	41248	60394
	25	-91161	-61532	-35241	-21990	-12620	6616	11099	17380	29793	43759
	30	-96642	-65407	-37692	-23723	-13846	4875	8342	13193	22771	33545
	35	-100813	-68357	-39557	-25042	-14779	3736	6524	10418	18102	26743
	40	-104093	-70676	-41024	-26079	-15512	2945	5253	8470	14814	21946
4	5	-12971	-8232	-3434	-682	1602	40998	58440	80235	117794	154797
	10	-24995	-17776	-10465	-6243	-2892	14734	21396	29701	43995	58068
	15	-30901	-22463	-13919	-8984	-5068	8170	12102	16995	25405	33682
	20	-34428	-25262	-15961	-10622	-6367	5314	8031	11404	17196	22893
	25	-36775	-27125	-17354	-11711	-7232	3766	5809	8338	12676	16941
	30	-38449	-28454	-18333	-12488	-7849	2818	4436	6435	9860	13226
	35	-39704	-29450	-19067	-13071	-8311	2188	3518	5157	7961	10715
	40	-40680	-30225	-19638	-13524	-8671	1746	2869	4248	6605	8920
5	5	-8659	-5690	-2478	-493	1217	27198	37156	48854	67638	84923
	10	-15586	-11515	-7111	-4388	-2099	9915	13806	18361	25661	32371
	15	-18761	-14185	-9233	-6173	-3600	5565	7909	10646	15024	19045
	20	-20601	-15733	-10464	-7208	-4470	3657	5304	7222	10286	13098
	25	-21806	-16745	-11270	-7886	-5040	2615	3871	5330	7656	9790
	30	-22656	-17460	-11838	-8364	-5442	1971	2980	4147	6006	7709
	35	-23289	-17992	-12261	-8720	-5741	1541	2379	3347	4885	6293
	40	-23778	-18403	-12588	-8995	-5972	1236	1952	2774	4080	5274
6	5	-6471	-4338	-1938	-392	981	20224	26948	34555	46253	56579
	10	-11203	-8459	-5368	-3378	-1647	7437	10102	13104	17708	21766
	15	-13283	-10269	-6875	-4691	-2789	4205	5831	7657	10452	12912
	20	-14468	-11300	-7734	-5438	-3440	2780	3935	5228	7204	8942
	25	-15235	-11968	-8290	-5922	-3861	1998	2887	3879	5392	6722
	30	-15773	-12437	-8680	-6262	-4157	1513	2233	3033	4251	5320
	35	-16172	-12784	-8969	-6513	-4376	1187	1790	2458	3472	4362
	40	-16479	-13051	-9192	-6707	-4544	956	1474	2045	2911	3670

TABLE F($s = 3$) (Continued)

n= 7		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
3	5	-20151	-11320	-3484	466	3717	94317	146629	220338	366329	530740
	10	-49409	-32008	-16568	-8787	-3284	33709	53162	80545	134757	195798
	15	-66871	-44356	-24378	-14309	-7189	18527	29685	45375	76423	111377
	20	-78289	-52429	-29484	-17919	-9742	11950	19459	30006	50866	74346
	25	-86303	-58096	-33068	-20454	-11534	8409	13920	21650	36932	54130
	30	-92227	-62286	-35718	-22327	-12859	6255	10527	16513	28341	41648
	35	-96782	-65506	-37754	-23767	-13877	4834	8277	13093	22603	33301
	40	-100391	-68058	-39369	-24909	-14684	3844	6697	10682	18547	27393
4	5	-10871	-6565	-2205	313	2546	48845	69474	95254	139683	183457
	10	-22802	-16035	-9183	-5225	-2084	17896	25854	35780	52867	69692
	15	-28950	-20915	-12778	-8079	-4349	10058	14780	20660	30773	40726
	20	-32717	-23905	-14981	-9828	-5737	6613	9886	13954	20943	27820
	25	-35265	-25927	-16471	-11010	-6676	4731	7196	10253	15501	20662
	30	-37103	-27385	-17546	-11863	-7353	3570	5526	7946	12097	16177
	35	-38492	-28488	-18358	-12508	-7864	2795	4404	6390	9792	13136
	40	-39578	-29350	-18993	-13012	-8265	2248	3606	5280	8143	10956
5	5	-7364	-4601	-1612	236	1939	32348	44089	57885	80038	100426
	10	-14374	-10496	-6300	-3706	-1526	12001	16621	22034	30711	38688
	15	-17726	-13314	-8541	-5591	-3111	6820	9613	12877	18103	22904
	20	-19713	-14986	-9871	-6709	-4051	4527	6494	8787	12453	15820
	25	-21033	-16095	-10753	-7451	-4674	3265	4767	6513	9302	11861
	30	-21973	-16886	-11382	-7980	-5119	2482	3688	5087	7318	9363
	35	-22678	-17478	-11853	-8376	-5452	1956	2958	4118	5986	7659
	40	-23225	-17939	-12219	-8684	-5711	1582	2437	3423	4993	6430
7	5	-4447	-2871	-1048	158	1314	19059	24924	31391	41052	49345
	10	-8111	-6135	-3850	-2339	-993	7161	9518	12106	15960	19262
	15	-9736	-7583	-5092	-3446	-1979	4115	5569	7159	9524	11548
	20	-10668	-8413	-5805	-4081	-2545	2758	3798	4934	6620	8061
	25	-11275	-8954	-6270	-4495	-2913	2005	2812	3689	4989	6099
	30	-11703	-9335	-6597	-4786	-3173	1535	2191	2903	3955	4853
	35	-12021	-9618	-6840	-5003	-3366	1217	1769	2366	3246	3997
	40	-12266	-9837	-7027	-5170	-3515	990	1466	1978	2734	3377

TABLE F($s = 3$) (Continued)

n= 8		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
3	5	-16444	-8699	-1826	1673	5043	109811	170477	255960	425276	615957
	10	-44233	-28348	-14254	-7150	-2127	39976	62826	94996	158690	230409
	15	-61682	-40687	-22057	-12668	-6029	22259	35465	54042	90810	132204
	20	-73425	-48990	-27309	-16381	-8654	14503	23435	35987	60820	88774
	25	-81821	-54927	-31064	-19036	-10532	10293	16870	26104	44364	64915
	30	-88109	-59374	-33876	-21025	-11938	7713	12825	19995	34166	50113
	35	-92990	-62825	-36058	-22568	-13029	6003	10129	15909	27328	40176
	40	-96886	-65580	-37801	-23800	-13900	4804	8229	13019	22479	33121
4	5	-9123	-5178	-1183	1140	3461	56727	80554	110334	161659	212226
	10	-20868	-14500	-8052	-4328	-1372	21107	30377	41941	61853	81462
	15	-27177	-19507	-11741	-7256	-3696	11995	17521	24405	36250	47910
	20	-31134	-22648	-14055	-9093	-5154	7956	11797	16575	24789	32871
	25	-33849	-24803	-15643	-10353	-6154	5735	8633	12232	18413	24493
	30	-35829	-26374	-16801	-11272	-6884	4358	6660	9513	14410	19225
	35	-37337	-27571	-17683	-11972	-7439	3434	5328	7673	11692	15643
	40	-38523	-28513	-18376	-12522	-7876	2779	4379	6356	9742	13070
5	5	-6262	-3674	-875	865	2639	37519	51050	66949	92482	115981
	10	-13288	-9583	-5574	-3096	-1012	14116	19473	25751	35817	45072
	15	-16774	-12514	-7905	-5056	-2660	8104	11352	15151	21236	26827
	20	-18883	-14288	-9315	-6242	-3658	5423	7714	10389	14668	18598
	25	-20302	-15481	-10264	-7040	-4329	3940	5691	7731	10991	13983
	30	-21322	-16339	-10947	-7614	-4811	3014	4421	6057	8667	11062
	35	-22092	-16986	-11461	-8047	-5175	2389	3560	4917	7081	9065
	40	-22693	-17492	-11863	-8385	-5460	1944	2942	4097	5936	7622
8	5	-3203	-1958	-491	502	1543	16261	23561	29299	37694	44755
	10	-6210	-4682	-2881	-1666	-566	6971	9121	11437	14816	17651
	15	-7555	-5900	-3949	-2634	-1443	4055	5390	6824	8913	10663
	20	-8333	-6604	-4567	-3194	-1950	2745	3706	4736	6233	7487
	25	-8842	-7066	-4972	-3560	-2282	2014	2762	3561	4721	5692
	30	-9202	-7392	-5258	-3819	-2517	1554	2165	2816	3758	4547
	35	-9470	-7635	-5471	-4012	-2691	1242	1757	2305	3096	3758
	40	-9678	-7823	-5636	-4162	-2827	1018	1463	1935	2616	3184

TABLE F($s = 3$) (Continued)

n= 9		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
3	5	-13440	-6575	-483	2755	6345	125358	194404	291698	484412	701443
	10	-39767	-25191	-12257	-5738	-1128	46331	72616	109629	182915	265438
	15	-57053	-37413	-19987	-11204	-4993	26081	41375	62895	105493	153453
	20	-68992	-45856	-25326	-14979	-7663	17139	27530	42139	71046	103587
	25	-77676	-51997	-29210	-17726	-9605	12251	19927	30710	52038	76044
	30	-84260	-56652	-32154	-19808	-11077	9238	15219	23612	40207	58883
	35	-89417	-60298	-34461	-21438	-12230	7231	12067	18846	32245	47322
	40	-93562	-63230	-36314	-22749	-13157	5818	9836	15464	26582	39091
4	5	-7646	-4006	-319	1892	4360	64634	91668	125457	183694	241073
	10	-19149	-13136	-7047	-3530	-739	24357	34948	48166	70927	93342
	15	-25559	-18223	-10795	-6505	-3100	13970	20310	28213	41813	55202
	20	-29663	-21481	-13195	-8410	-4612	9335	13754	19255	28713	38023
	25	-32520	-23748	-14866	-9736	-5664	6771	10112	14263	21396	28415
	30	-34622	-25417	-16095	-10712	-6439	5174	7830	11127	16787	22354
	35	-36235	-26697	-17039	-11461	-7033	4098	6286	8997	13649	18223
	40	-37512	-27710	-17785	-12053	-7503	3333	5183	7471	11393	15249
5	5	-5310	-2874	-239	1441	3327	42705	58029	76037	104957	131573
	10	-12309	-8759	-4919	-2545	-549	16253	22351	29500	40965	51508
	15	-15895	-11775	-7317	-4562	-2245	9410	13118	17458	24411	30801
	20	-18106	-13634	-8795	-5805	-3290	6340	8960	12022	16921	21422
	25	-19610	-14899	-9802	-6651	-4002	4633	6638	8976	12714	16146
	30	-20702	-15817	-10532	-7265	-4518	3563	5175	7051	10049	12799
	35	-21530	-16514	-11086	-7731	-4910	2839	4180	5738	8224	10505
	40	-22181	-17061	-11521	-8097	-5217	2321	3465	4791	6906	8844
9	5	-2373	-1347	-119	739	1712	17680	22583	27816	35353	41596
	10	-4936	-3696	-2214	-1200	-271	6832	8833	10959	14010	16531
	15	-6092	-4756	-3159	-2067	-1066	4012	5261	6584	8480	10045
	20	-6765	-5373	-3710	-2572	-1528	2737	3640	4594	5959	7085
	25	-7208	-5779	-4072	-2904	-1833	2022	2727	3470	4531	5405
	30	-7522	-6068	-4329	-3140	-2049	1570	2147	2754	3619	4331
	35	-7757	-6283	-4521	-3316	-2211	1262	1750	2282	2990	3589
	40	-7939	-6450	-4670	-3452	-2336	1040	1463	1904	2532	3048

TABLE F($s = 3$) (Continued)

n= 10		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
3	5	-10966	-4825	625	3774	7632	140943	218387	327520	543683	787124
	10	-35883	-22444	-10520	-4510	-260	52753	82504	124402	207366	300788
	15	-52901	-34478	-18130	-9891	-4065	29975	47389	71897	120413	175039
	20	-64938	-42989	-23513	-13698	-6757	19844	31724	48432	81495	118718
	25	-73835	-49280	-27492	-16511	-8746	14272	23074	35444	59916	87463
	30	-80657	-54104	-30543	-18668	-10271	10820	17693	27345	46431	67914
	35	-86046	-57915	-32953	-20372	-11477	8510	14077	21887	37327	54702
	40	-90407	-60999	-34904	-21752	-12452	6877	11510	18003	30834	45271
4	5	-6381	-3002	421	2602	5249	72559	102805	140611	205773	269976
	10	-17612	-11916	-6148	-2816	-172	27634	39557	54438	80066	105307
	15	-24075	-17045	-9927	-5816	-2553	15975	23139	32071	47445	62582
	20	-28294	-20394	-12395	-7775	-4108	10742	15748	21981	32703	43257
	25	-31268	-22755	-14134	-9155	-5203	7835	11624	16337	24439	32412
	30	-33478	-24508	-15426	-10181	-6017	6015	9032	12780	19219	25552
	35	-35184	-25863	-16424	-10973	-6646	4785	7273	10359	15656	20865
	40	-36542	-26940	-17218	-11603	-7146	3907	6012	8618	13089	17485
5	5	-4480	-2176	317	1988	4007	47902	65022	85141	117454	147192
	10	-11420	-8012	-4325	-2046	-129	18408	25250	33276	46146	57983
	15	-15080	-11090	-6772	-4104	-1860	10733	14905	19791	27619	34814
	20	-17375	-13019	-8307	-5394	-2945	7274	10227	13679	19207	24285
	25	-18954	-14348	-9363	-6282	-3692	5342	7604	10244	14466	18345
	30	-20109	-15319	-10135	-6932	-4238	4127	5947	8067	11456	14567
	35	-20991	-16060	-10725	-7428	-4655	3301	4816	6578	9392	11973
	40	-21687	-16646	-11190	-7819	-4984	2710	4002	5503	7897	10093
10	5	-1788	-914	142	914	1842	17238	21846	26711	33631	39294
	10	-4029	-2989	-1732	-862	-57	6727	8616	10600	13413	15710
	15	-5048	-3933	-2584	-1651	-787	3980	5164	6404	8159	9589
	20	-5645	-4485	-3083	-2113	-1216	2733	3591	4488	5755	6788
	25	-6040	-4851	-3413	-2419	-1499	2030	2702	3402	4390	5194
	30	-6321	-5112	-3649	-2637	-1700	1585	2135	2708	3516	4172
	35	-6532	-5307	-3825	-2800	-1851	1280	1746	2230	2911	3465
	40	-6696	-5458	-3962	-2927	-1969	1059	1464	1882	2470	2948

TABLE F($s = 3$) (Continued)

n= 12		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
3	5	-7150	-2127	2427	5711	10175	172187	266468	399330	662498	958878
	10	-29477	-17915	-7655	-2484	1188	65740	102491	154254	256758	372186
	15	-45777	-29441	-14944	-7638	-2472	37926	59653	90240	150798	218984
	20	-57800	-37941	-20321	-11440	-5160	25416	40345	61349	102925	149734
	25	-66943	-44407	-24410	-14331	-7205	18465	29586	45223	76167	111002
	30	-74102	-49469	-27612	-16595	-8806	14123	22842	35094	59333	86618
	35	-79849	-53533	-30182	-18413	-10091	11195	18280	28228	47904	70049
	40	-84558	-56862	-32288	-19902	-11144	9113	15023	23316	39713	58166
4	5	-4328	-1372	1667	3958	7005	88444	125128	170984	250023	327899
	10	-14978	-9825	-4607	-1594	805	34253	48856	67089	98494	129425
	15	-21451	-14963	-8393	-4598	-1587	20055	28886	39903	58868	77544
	20	-25822	-18432	-10949	-6627	-3197	13626	19823	27547	40836	53920
	25	-28974	-20934	-12792	-8090	-4358	10025	14732	20591	30669	40588
	30	-31356	-22824	-14185	-9196	-5236	7756	11513	16184	24214	32116
	35	-33219	-24303	-15275	-10060	-5922	6214	9316	13170	19791	26304
	40	-34716	-25491	-16150	-10755	-6474	5107	7735	10995	16593	22099
5	5	-3096	-1012	1271	3033	5353	58319	79037	103387	142494	178488
	10	-9869	-6708	-3287	-1173	609	22753	31095	40882	56581	71021
	15	-13617	-9860	-5794	-3281	-1168	13422	18531	24517	34112	42934
	20	-16038	-11896	-7413	-4642	-2313	9182	12809	17053	23851	30099
	25	-17739	-13325	-8550	-5599	-3117	6798	9582	12835	18041	22825
	30	-19000	-14386	-9394	-6308	-3713	5290	7532	10150	14337	18182
	35	-19975	-15206	-10045	-6856	-4174	4260	6128	8306	11787	14982
	40	-20750	-15858	-10564	-7292	-4541	3518	5114	6970	9936	12657
10	5	-1273	-438	581	1402	2465	20941	26493	32354	40693	47518
	10	-3568	-2562	-1346	-505	275	8276	10557	12956	16357	19134
	15	-4651	-3565	-2252	-1344	-503	4945	6375	7877	10002	11736
	20	-5301	-4167	-2795	-1847	-969	3422	4460	5547	7084	8337
	25	-5737	-4571	-3160	-2185	-1282	2560	3373	4222	5420	6397
	30	-6051	-4862	-3423	-2428	-1507	2011	2677	3372	4352	5150
	35	-6289	-5081	-3622	-2612	-1677	1634	2198	2785	3612	4285
	40	-6475	-5254	-3777	-2756	-1810	1360	1849	2357	3071	3652
12	5	-1030	-357	477	1155	2029	16611	20811	25174	31270	36172
	10	-2836	-2052	-1089	-412	225	6577	8309	10099	12589	14586
	15	-3668	-2834	-1808	-1087	-410	3937	5027	6152	7714	8965
	20	-4162	-3297	-2235	-1487	-786	2730	3523	4340	5473	6380
	25	-4492	-3607	-2519	-1755	-1037	2045	2668	3308	4195	4904
	30	-4728	-3829	-2723	-1946	-1217	1609	2121	2646	3373	3954
	35	-4906	-3996	-2877	-2091	-1352	1309	1744	2188	2803	3294
	40	-5045	-4126	-2997	-2204	-1458	1091	1468	1854	2386	2810

TABLE F($s = 3$) (Continued)

n= 15		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
3	5	-3245	635	4730	8491	13941	219167	338761	507299	841138	1217109
	10	-22303	-12842	-4446	-215	3049	85455	132814	199528	331647	480429
	15	-37343	-23477	-11173	-4971	-586	50135	78459	118343	197317	286244
	20	-49022	-31735	-16395	-8664	-3198	34064	53694	81326	136029	197623
	25	-58234	-38249	-20515	-11577	-5258	25038	39759	60471	101467	147623
	30	-65646	-43490	-23830	-13921	-6915	19344	30947	47264	79555	115907
	35	-71723	-47787	-26547	-15843	-8274	15472	24940	38247	64576	94213
	40	-76787	-51367	-28812	-17444	-9406	12698	20623	31756	53779	78567
4	5	-2061	428	3288	5907	9610	112327	158688	216643	316538	414966
	10	-11852	-7344	-2779	-143	2086	44282	62940	86240	126379	165915
	15	-18195	-12378	-6489	-3087	-387	26295	37663	51850	76280	100340
	20	-22659	-15922	-9099	-5159	-2032	18074	26095	36097	53316	70270
	25	-25975	-18553	-11038	-6698	-3253	13430	19546	27168	40282	53193
	30	-28535	-20585	-12536	-7886	-4196	10482	15378	21475	31961	42282
	35	-30572	-22202	-13727	-8832	-4947	8463	12517	17560	26230	34762
	40	-32231	-23519	-14697	-9602	-5558	7007	10447	14722	22069	29298
5	5	-1509	322	2523	4538	7348	73980	100104	130810	180129	225521
	10	-7973	-5113	-2019	-107	1586	29333	39939	52386	72356	90724
	15	-11758	-8297	-4551	-2236	-289	17526	24055	31711	43988	55277
	20	-14294	-10429	-6247	-3662	-1488	12117	16770	22220	30955	38984
	25	-16122	-11966	-7469	-4689	-2352	9053	12634	16823	23535	29702
	30	-17504	-13128	-8393	-5467	-3006	7101	9992	13371	18781	23750
	35	-18587	-14039	-9117	-6076	-3518	5761	8173	10989	15495	19634
	40	-19460	-14772	-9701	-6566	-3931	4790	6852	9256	13101	16632
10	5	-644	145	1169	2109	3390	26507	33476	40834	51303	59872
	10	-2977	-2015	-852	-47	724	10617	13490	16512	20798	24298
	15	-4127	-3080	-1814	-938	-127	6411	8216	10111	12795	14986
	20	-4837	-3737	-2407	-1487	-636	4477	5787	7161	9105	10690
	25	-5323	-4187	-2814	-1864	-984	3376	4401	5475	6993	8230
	30	-5678	-4516	-3111	-2139	-1239	2670	3511	4391	5632	6644
	35	-5949	-4767	-3338	-2349	-1434	2183	2895	3638	4687	5541
	40	-6164	-4966	-3517	-2515	-1587	1828	2445	3088	3994	4731
15	5	-410	93	761	1375	2206	16023	19853	23770	29146	33396
	10	-1824	-1252	-540	-30	469	6437	8023	9637	11842	13578
	15	-2487	-1884	-1131	-593	-82	3899	4902	5920	7309	8403
	20	-2887	-2264	-1487	-932	-404	2731	3463	4206	5217	6013
	25	-3157	-2521	-1728	-1161	-622	2065	2641	3224	4019	4643
	30	-3352	-2707	-1902	-1327	-780	1637	2112	2592	3245	3758
	35	-3500	-2848	-2034	-1453	-899	1342	1746	2153	2707	3141
	40	-3616	-2959	-2138	-1551	-993	1126	1478	1831	2312	2688

TABLE F($s = 3$) (Continued)

n= 20		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
3	5	676	3707	8214	12973	20149	297614	459475	687585	1139428	1648297
	10	-14313	-7192	-873	2425	5928	118647	183848	275707	457632	662505
	15	-27288	-16366	-6676	-1791	1713	70920	110439	166101	276329	400454
	20	-38038	-23968	-11483	-5191	-742	48955	76637	115616	192798	279706
	25	-46936	-30260	-15463	-8005	-2731	36477	57414	86887	145237	210937
	30	-54365	-35513	-18785	-10354	-4392	28520	45138	68524	114815	166935
	35	-60637	-39948	-21590	-12337	-5795	23057	36695	55880	93851	136601
	40	-65989	-43733	-23984	-14030	-6992	19105	30577	46709	78632	114570
4	5	456	2575	5756	9056	13907	152207	214724	292879	427594	560330
	10	-8081	-4351	-574	1662	4074	61150	86614	118421	173220	227201
	15	-14046	-9085	-4062	-1161	1165	36883	52536	72080	105743	138898
	20	-18470	-12597	-6650	-3215	-489	25691	36811	50687	74582	98113
	25	-21885	-15307	-8647	-4800	-1747	19311	27835	38468	56771	74793
	30	-24602	-17464	-10235	-6061	-2747	15225	22079	30622	45324	59799
	35	-26815	-19220	-11529	-7088	-3563	12407	18100	25193	37395	49408
	40	-28652	-20678	-12604	-7941	-4239	10358	15202	21234	31608	41818
5	5	344	1975	4438	6972	10643	100128	135278	176594	242957	304036
	10	-5593	-3112	-427	1265	3108	40392	54794	71700	98830	123787
	15	-9310	-6238	-2913	-859	883	24477	33402	43872	60667	76112
	20	-11918	-8430	-4657	-2325	-364	17128	23518	31010	43022	54067
	25	-13861	-10065	-5957	-3418	-1283	12932	17867	23649	32917	41436
	30	-15370	-11334	-6966	-4267	-1997	10238	14234	18912	26407	33296
	35	-16578	-12349	-7773	-4946	-2568	8376	11718	15626	21887	27639
	40	-17566	-13180	-8435	-5502	-3035	7019	9880	13224	18578	23497
10	5	154	913	2076	3255	4919	35800	45132	54988	69010	80487
	10	-2183	-1280	-188	577	1427	14547	18409	22474	28240	32949
	15	-3397	-2404	-1203	-373	400	8888	11319	13874	17496	20453
	20	-4173	-3122	-1852	-974	-160	6269	8036	9892	12520	14664
	25	-4719	-3627	-2308	-1396	-551	4769	6153	7605	9660	11336
	30	-5125	-4004	-2648	-1711	-843	3802	4938	6128	7811	9183
	35	-5441	-4296	-2912	-1955	-1069	3131	4093	5099	6522	7681
	40	-5694	-4530	-3124	-2151	-1250	2640	3473	4344	5574	6576
15	5	99	594	1356	2125	3203	21625	28747	31984	39174	44858
	10	-1353	-805	-120	374	927	8806	10931	13094	16051	18380
	15	-2068	-1486	-758	-238	259	5394	6738	8105	9971	11439
	20	-2513	-1909	-1154	-616	-103	3813	4796	5793	7153	8223
	25	-2821	-2201	-1428	-876	-351	2907	3680	4464	5532	6372
	30	-3047	-2417	-1630	-1069	-534	2323	2960	3605	4483	5174
	35	-3222	-2583	-1786	-1217	-675	1917	2458	3006	3751	4336
	40	-3360	-2715	-1910	-1334	-787	1619	2090	2565	3212	3719
20	5	73	440	1007	1578	2375	15471	18964	22482	27228	30918
	10	-980	-587	-89	277	686	6307	7758	9211	11162	12672
	15	-1486	-1074	-553	-175	191	3867	4788	5708	6942	7896
	20	-1796	-1374	-838	-450	-76	2737	3412	4085	4986	5683
	25	-2009	-1579	-1034	-639	-257	2089	2621	3151	3861	4409
	30	-2165	-1729	-1177	-777	-391	1671	2110	2547	3132	3583
	35	-2285	-1845	-1287	-883	-493	1380	1754	2126	2623	3006
	40	-2380	-1936	-1374	-967	-574	1167	1492	1816	2248	2581

TABLE F($s = 3$) (Continued)

n= 25		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
3	5	3153	6248	11529	17366	26310	376145	580323	868072	1438050	2079965
	10	-9149	-3541	1454	4622	8715	152047	235195	352344	584364	845652
	15	-20349	-11460	-3572	403	3648	91999	142852	214488	356354	516112
	20	-30084	-18344	-7926	-2676	1047	64189	100079	150628	250724	363440
	25	-38445	-24256	-11665	-5320	-833	48283	75600	114065	190228	275988
	30	-45634	-29339	-14880	-7593	-2440	38070	59868	90554	151308	219716
	35	-51849	-33734	-17660	-9558	-3830	31010	48981	74273	124341	180715
	40	-57259	-37559	-20079	-11269	-5040	25873	41048	62400	104664	152248
4	5	2186	4387	8110	12147	18175	192133	270823	369199	538770	705851
	10	-5421	-2239	990	3196	5999	78115	110418	150773	220304	288797
	15	-10962	-6637	-2259	270	2499	47602	67582	92533	135516	177852
	20	-15234	-10028	-4757	-1713	708	33455	47719	65525	96193	126397
	25	-18631	-12724	-6743	-3289	-548	25347	36326	50026	73617	96849
	30	-21397	-14920	-8361	-4573	-1567	20126	28983	40029	59047	77773
	35	-23694	-16743	-9704	-5639	-2413	16506	23883	33082	48913	64501
	40	-25632	-18281	-10837	-6539	-3127	13861	20153	27995	41489	54774
5	5	1674	3385	6269	9363	13916	126306	170490	222427	305849	382630
	10	-3838	-1636	751	2446	4583	51510	69724	91109	125428	156999
	15	-7421	-4649	-1650	204	1903	31507	42846	56152	77500	97134
	20	-10021	-6836	-3389	-1259	535	22227	30375	39931	55259	69354
	25	-12010	-8508	-4719	-2377	-408	16902	23213	30611	42473	53381
	30	-13587	-9834	-5773	-3264	-1154	13469	18590	24590	34208	43051
	35	-14869	-10913	-6631	-3985	-1760	11083	15374	20398	28449	35850
	40	-15934	-11808	-7343	-4584	-2264	9338	13017	17324	24222	30561
10	5	772	1585	2947	4382	6439	45102	56800	69154	86732	101120
	10	-1553	-697	340	1128	2110	18495	23349	28459	35708	41630
	15	-2798	-1849	-702	91	870	11388	14448	17667	22230	25955
	20	-3614	-2605	-1385	-541	241	8086	10314	12654	15970	18676
	25	-4200	-3147	-1874	-994	-179	6188	7934	9767	12364	14482
	30	-4643	-3558	-2245	-1338	-497	4961	6394	7898	10026	11761
	35	-4992	-3880	-2537	-1608	-747	4106	5320	6592	8392	9859
	40	-5274	-4142	-2773	-1826	-949	3478	4530	5631	7188	8457
15	5	502	1035	1929	2864	4194	27233	33646	40206	49209	56328
	10	-973	-443	220	733	1372	11186	13851	16564	20274	23197
	15	-1719	-1153	-446	59	564	6901	8589	10305	12648	14494
	20	-2194	-1605	-870	-345	156	4910	6143	7396	9106	10452
	25	-2528	-1923	-1168	-628	-115	3765	4735	5720	7064	8121
	30	-2778	-2161	-1391	-840	-317	3023	3823	4634	5739	6609
	35	-2973	-2347	-1564	-1006	-474	2506	3186	3875	4813	5550
	40	-3130	-2495	-1704	-1138	-600	2127	2717	3315	4129	4769
20	5	372	769	1433	2128	3110	19479	23851	28254	34195	38815
	10	-708	-324	162	543	1016	8007	9825	11646	14091	15984
	15	-1240	-837	-327	43	417	4945	6099	7252	8800	9997
	20	-1574	-1159	-634	-253	115	3522	4366	5211	6342	7217
	25	-1807	-1384	-848	-459	-85	2702	3369	4034	4925	5613
	30	-1980	-1551	-1007	-613	-232	2172	2722	3271	4005	4572
	35	-2114	-1680	-1130	-732	-347	1802	2270	2737	3361	3843
	40	-2222	-1784	-1229	-827	-439	1530	1938	2344	2886	3305

TABLE F($s = 3$) (Continued)

n= 25		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
25	5	295	611	1141	1693	2472	15155	18461	21759	26166	29558
	10	-556	-256	129	432	807	6233	7608	8972	10783	12172
	15	-969	-657	-258	34	331	3851	4725	5590	6738	7617
	20	-1227	-907	-498	-200	91	2744	3385	4019	4859	5502
	25	-1405	-1081	-685	-362	-67	2107	2613	3113	3775	4282
	30	-1537	-1209	-789	-482	-184	1694	2112	2525	3071	3489
	35	-1640	-1308	-885	-575	-274	1407	1763	2114	2579	2934
	40	-1721	-1388	-961	-649	-346	1195	1505	1811	2216	2524

TABLE F($s = 3$) (Continued)

n= 30		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
3	5	5199	8612	14766	21714	32445	454718	701236	1048657	1736836	2511869
	10	-5586	-1021	3265	6684	11458	185553	286702	429217	711481	1029352
	15	-15324	-7907	-1325	2061	5488	113236	175500	263217	436935	632564
	20	-24107	-14117	-5253	-785	2537	79618	123808	186053	309318	448126
	25	-31873	-19609	-8726	-3242	639	60305	94103	141700	235952	342086
	30	-38712	-24445	-11785	-5404	-892	47849	74931	113064	188569	273590
	35	-44743	-28709	-14482	-7311	-2241	39199	61607	93154	155612	225939
	40	-50082	-32484	-16869	-8999	-3435	32876	51860	78579	131474	191031
4	5	3647	6080	10413	15209	22426	232081	326954	445562	650008	851452
	10	-3443	-669	2255	4641	7896	95130	134291	183217	267517	350560
	15	-8579	-4746	-865	1409	3770	58392	82722	113111	165463	217031
	20	-12658	-7984	-3251	-517	1733	41305	58740	80509	118006	154939
	25	-15979	-10620	-5193	-2058	430	31477	44939	61742	90682	119183
	30	-18736	-12808	-6805	-3338	-586	25125	36013	49600	72995	96034
	35	-21061	-14653	-8165	-4417	-1443	20704	29795	41136	60659	79884
	40	-23049	-16231	-9327	-5340	-2175	17464	25233	34921	51597	68016
5	5	2812	4707	8060	11732	17178	152500	205722	268285	368775	461265
	10	-2484	-498	1724	3561	6037	62660	84696	110569	152093	190293
	15	-5913	-3382	-642	1071	2876	38580	52345	68500	94421	118263
	20	-8468	-5530	-2350	-385	1317	27377	37295	48930	67596	84762
	25	-10463	-7207	-3684	-1507	324	20928	28627	37657	52138	65454
	30	-12071	-8559	-4760	-2411	-437	16756	23016	30354	42120	52938
	35	-13397	-9675	-5647	-3157	-1064	13849	19102	25257	35123	44194
	40	-14512	-10612	-6392	-3784	-1591	11715	16226	21509	29975	37758
10	5	1314	2218	3801	5500	7954	54409	68474	83327	104462	121761
	10	-1036	-218	793	1651	2784	22453	28300	34456	43192	50327
	15	-2293	-1382	-280	487	1319	13900	17592	21476	26983	31479
	20	-3134	-2161	-984	-169	599	9919	12608	15435	19442	22712
	25	-3747	-2728	-1496	-644	145	7624	9733	11950	15090	17652
	30	-4217	-3163	-1889	-1008	-192	6136	7869	9687	12263	14365
	35	-4591	-3509	-2201	-1297	-460	5097	6565	8105	10285	12062
	40	-4895	-3791	-2456	-1533	-678	4332	5605	6938	8825	10363
15	5	858	1452	2490	3597	5182	32844	40550	48431	59249	67802
	10	-654	-140	515	1075	1811	13572	16777	20041	24504	28021
	15	-1419	-868	-179	316	857	8416	10447	12514	15336	17558
	20	-1916	-1340	-622	-109	388	6016	7500	9010	11070	12692
	25	-2270	-1677	-938	-409	94	4631	5800	6987	8607	9882
	30	-2538	-1933	-1177	-637	-123	3733	4696	5674	7007	8056
	35	-2749	-2133	-1364	-816	-293	3106	3924	4754	5886	6776
	40	-2920	-2296	-1517	-960	-431	2643	3355	4076	5058	5831
20	5	637	1080	1852	2673	3844	23489	28740	34029	41165	46714
	10	-478	-103	381	797	1342	9712	11897	14086	17026	19302
	15	-1027	-632	-132	233	634	6028	7415	8803	10664	12105
	20	-1379	-971	-454	-80	287	4312	5328	6343	7705	8758
	25	-1627	-1210	-683	-300	69	3322	4123	4923	5998	6825
	30	-1814	-1390	-854	-465	-90	2680	3341	4001	4885	5568
	35	-1960	-1531	-988	-595	-215	2231	2794	3355	4106	4687
	40	-2077	-1645	-1096	-699	-316	1900	2390	2879	3532	4036

TABLE F($s = 3$) (Continued)

n= 30		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
25	5	506	859	1474	2127	3055	18274	22243	26205	31496	35570
	10	-377	-81	303	634	1066	7558	9210	10849	13026	14695
	15	-805	-497	-104	185	504	4693	5743	6783	8163	9220
	20	-1077	-761	-358	-63	228	3359	4128	4890	5901	6674
	25	-1268	-947	-537	-237	55	2589	3197	3798	4594	5203
	30	-1410	-1086	-670	-367	-71	2090	2591	3088	3745	4247
	35	-1522	-1194	-775	-468	-170	1740	2168	2590	3149	3577
	40	-1612	-1281	-859	-549	-249	1483	1855	2223	2710	3081
30	5	420	714	1224	1766	2535	14951	18137	21297	25491	28700
	10	-311	-67	251	526	884	6186	7511	8818	10542	11855
	15	-662	-410	-86	153	418	3842	4685	5515	6609	7440
	20	-883	-626	-295	-52	189	2751	3369	3978	4779	5388
	25	-1038	-777	-442	-196	45	2121	2609	3090	3722	4202
	30	-1154	-890	-552	-302	-59	1712	2116	2513	3035	3431
	35	-1244	-978	-637	-386	-140	1426	1771	2109	2553	2890
	40	-1316	-1049	-705	-453	-206	1216	1516	1810	2197	2490

TABLE F($s = 3$) (Continued)

n= 35		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
3	5	7078	10891	17960	26036	38564	533314	822185	1229297	2035713	2943908
	10	-3005	806	4894	8683	14175	219119	338300	506226	838820	1213374
	15	-11547	-5236	364	3517	7287	134567	208288	312150	517849	749493
	20	-19480	-10845	-3184	679	3932	95166	147713	221734	368326	533405
	25	-26664	-15925	-6397	-1594	1868	72466	112807	169628	282148	408855
	30	-33116	-20487	-9282	-3634	359	57778	90212	135890	226338	328187
	35	-38901	-24578	-11869	-5464	-935	47545	74463	112365	187411	271914
	40	-44096	-28251	-14192	-7107	-2096	40041	62905	95093	158822	230580
4	5	4997	7716	12687	18253	26669	272042	383103	521949	761282	997100
	10	-1915	544	3405	6044	9776	112176	158206	215715	314806	412422
	15	-6683	-3241	244	2424	5013	69225	97921	133765	195518	256347
	20	-10560	-6318	-2023	458	2695	49208	69831	95585	139948	183646
	25	-13777	-8872	-3905	-1036	1272	37667	53630	73561	107889	141700
	30	-16491	-11026	-5492	-2296	241	30189	43129	59280	87094	114488
	35	-18810	-12867	-6848	-3372	-614	24970	35795	49302	72561	95465
	40	-20816	-14459	-8021	-4303	-1353	21135	30402	41961	61862	81458
5	5	3868	5986	9831	14088	20434	178701	240965	314157	431719	539923
	10	-1404	411	2614	4644	7478	73830	99691	130059	178798	223636
	15	-4679	-2344	184	1851	3827	45680	61877	80889	111397	139459
	20	-7170	-4438	-1482	345	2053	32559	44255	57979	79998	100249
	25	-9148	-6101	-2805	-768	985	24990	34086	44757	61873	77613
	30	-10764	-7461	-3886	-1677	181	20082	27490	36176	50106	62915
	35	-12114	-8595	-4788	-2435	-457	16654	22879	30175	41873	52630
	40	-13258	-9558	-5554	-3079	-998	14132	19484	25754	35805	45046
10	5	1821	2833	4646	6613	9467	63719	80151	97505	122196	142407
	10	-601	185	1212	2160	3452	26417	33259	40462	50684	59034
	15	-1860	-981	82	850	1760	16422	20746	25295	31747	37016
	20	-2716	-1773	-633	155	939	11761	14913	18228	22927	26763
	25	-3347	-2356	-1162	-334	437	9070	11544	14145	17830	20838
	30	-3837	-2811	-1571	-713	81	7322	9355	11491	14516	16985
	35	-4229	-3174	-1899	-1017	-201	6099	7823	9632	12193	14283
	40	-4552	-3473	-2169	-1267	-432	5198	6692	8259	10478	12287
15	5	1192	1857	3045	4326	6169	38457	47455	56658	69291	79279
	10	-383	119	789	1409	2247	15960	19707	23523	28740	32851
	15	-1159	-620	53	552	1144	9936	12311	14728	18029	20630
	20	-1670	-1106	-403	100	609	7128	8863	10630	13041	14940
	25	-2039	-1458	-732	-214	283	5503	6871	8261	10158	11651
	30	-2321	-1726	-983	-453	52	4449	5576	6721	8283	9512
	35	-2545	-1939	-1183	-643	-128	3711	4669	5641	6967	8010
	40	-2727	-2113	-1345	-797	-276	3167	4000	4844	5995	6901
20	5	886	1382	2266	3215	4577	27500	33631	39806	48137	54615
	10	-280	88	585	1045	1666	11419	13971	16529	19963	22623
	15	-842	-453	39	409	847	7114	8734	10356	12533	14216
	20	-1205	-804	-295	74	451	5106	6293	7480	9072	10304
	25	-1466	-1055	-534	-157	209	3946	4882	5818	7072	8042
	30	-1663	-1245	-716	-332	38	3192	3965	4736	5770	6570
	35	-1818	-1395	-859	-470	-94	2664	3322	3978	4857	5537
	40	-1945	-1517	-975	-581	-202	2275	2847	3418	4182	4773

TABLE F($s = 3$) (Continued)

n= 35		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
25	5	705	1100	1804	2559	3638	21393	26027	30651	36827	41584
	10	-221	70	465	831	1323	8886	10814	12728	15271	17220
	15	-661	-357	31	324	673	5538	6764	7979	9591	10826
	20	-943	-631	-233	58	358	3976	4875	5765	6946	7850
	25	-1143	-826	-421	-124	166	3074	3784	4486	5417	6129
	30	-1295	-973	-562	-262	30	2488	3074	3654	4422	5009
	35	-1414	-1089	-674	-370	-75	2077	2577	3070	3724	4223
	40	-1511	-1183	-764	-458	-160	1774	2209	2639	3207	3642
30	5	585	914	1499	2125	3019	17502	21221	24910	29805	33550
	10	-183	58	386	690	1098	7271	8819	10345	12358	13891
	15	-544	-295	26	269	558	4533	5517	6486	7764	8735
	20	-774	-520	-192	48	297	3256	3978	4688	5624	6335
	25	-937	-679	-347	-103	137	2518	3088	3649	4387	4948
	30	-1060	-799	-463	-216	25	2038	2509	2973	3582	4045
	35	-1157	-893	-554	-305	-62	1702	2104	2499	3017	3411
	40	-1235	-969	-628	-377	-132	1454	1804	2148	2600	2943
35	5	500	782	1282	1817	2580	14808	17911	20977	25025	28108
	10	-156	49	330	589	938	6153	7444	8712	10375	11636
	15	-462	-251	22	230	477	3836	4658	5463	6519	7318
	20	-657	-442	-164	41	253	2756	3359	3950	4724	5309
	25	-794	-576	-295	-87	117	2132	2608	3075	3686	4147
	30	-898	-678	-394	-184	21	1726	2120	2505	3010	3391
	35	-979	-757	-471	-260	-53	1442	1778	2106	2536	2861
	40	-1044	-821	-533	-321	-113	1232	1525	1811	2185	2468

TABLE F($s = 3$) (Continued)

n= 40		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
3	5	8870	13120	21129	30342	44673	611923	943157	1409970	2334648	3376030
	10	-1066	2238	6437	10644	16875	252721	389954	583319	966299	1397596
	15	-8624	-3169	1701	4888	9061	155956	241164	361214	598976	866729
	20	-15812	-8252	-1544	1890	5285	110791	171733	257584	427608	619076
	25	-22452	-12947	-4513	-262	3004	84719	131648	197752	328662	476079
	30	-28515	-17234	-7224	-2179	1416	67810	105645	158933	264456	383284
	35	-34029	-21133	-9690	-3923	155	56002	87479	131806	219581	318419
	40	-39041	-24678	-11932	-5508	-966	47321	74117	111848	186555	270677
4	5	6288	9317	14944	21287	30904	312011	439284	598353	872578	1142776
	10	-698	1538	4497	7422	11646	129240	182146	248247	362145	474347
	15	-5137	-2015	1161	3383	6239	80087	113158	154469	225644	295755
	20	-8817	-4935	-1004	1290	3630	57147	80969	110722	161977	212464
	25	-11919	-7397	-2818	-174	2055	43898	62376	85450	125194	164341
	30	-14571	-9502	-4369	-1405	961	35297	50302	69035	101299	133076
	35	-16863	-11321	-5710	-2469	104	29284	41856	57549	84573	111187
	40	-18865	-12910	-6881	-3398	-634	24856	35634	49083	72240	95045
5	5	4879	7239	11588	16437	23684	204908	276216	360039	494677	618597
	10	-519	1172	3461	5710	8912	85011	114703	149569	205530	257012
	15	-3647	-1476	882	2590	4767	52797	71432	93307	128409	160698
	20	-6066	-3510	-744	980	2768	37763	51242	67062	92443	115789
	25	-8014	-5148	-2047	-130	1563	29077	39576	51895	71656	89831
	30	-9625	-6503	-3124	-1036	727	23435	31996	42038	58144	72956
	35	-10983	-7645	-4032	-1800	78	19488	26690	35135	48678	61131
	40	-12145	-8622	-4809	-2453	-472	16579	22777	30042	41691	52402
10	5	2309	3436	5485	7722	10978	73031	91830	111684	139933	163056
	10	-228	536	1613	2661	4118	30385	38222	46473	58183	67748
	15	-1482	-631	400	1195	2195	18948	23906	29122	36520	42561
	20	-2346	-1431	-324	445	1270	13609	17226	21029	26422	30824
	25	-2990	-2027	-863	-58	713	10523	13363	16349	20581	24036
	30	-3494	-2494	-1284	-448	329	8516	10851	13304	16780	19617
	35	-3901	-2871	-1625	-763	35	7110	9090	11168	14113	16516
	40	-4238	-3183	-1907	-1024	-207	6073	7789	9590	12142	14223
15	5	1513	2255	3597	5053	7155	44071	54361	64887	79335	90758
	10	-146	347	1052	1737	2681	18352	22640	27007	32978	37684
	15	-929	-401	259	777	1427	11459	14178	16946	20727	23705
	20	-1451	-898	-207	288	824	8241	10230	12254	15017	17193
	25	-1831	-1260	-546	-37	462	6380	7947	9540	11714	13426
	30	-2124	-1539	-808	-286	212	5170	6461	7773	9564	10973
	35	-2358	-1761	-1016	-484	22	4321	5419	6534	8055	9251
	40	-2550	-1944	-1187	-647	-133	3695	4649	5618	6938	7977
20	5	1126	1679	2677	3756	5308	31512	38523	45583	55109	62517
	10	-107	257	781	1289	1988	13128	16047	18974	22903	25946
	15	-677	-294	191	576	1058	8202	10056	11913	14404	16331
	20	-1050	-654	-152	213	610	5902	7261	8620	10443	11853
	25	-1319	-914	-400	-27	342	4572	5644	6715	8151	9262
	30	-1525	-1112	-589	-210	157	3707	4591	5475	6659	7575
	35	-1689	-1270	-739	-355	16	3100	3853	4605	5612	6390
	40	-1822	-1398	-862	-473	-98	2653	3308	3961	4837	5514

TABLE F($s = 3$) (Continued)

n= 40		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
25	5	896	1337	2132	2989	4219	24513	29811	35098	42160	47598
	10	-85	204	621	1025	1579	10214	12420	14609	17518	19748
	15	-532	-232	152	458	840	6384	7786	9176	11021	12434
	20	-822	-514	-120	169	485	4596	5624	6642	7994	9028
	25	-1031	-717	-315	-22	271	3561	4373	5177	6242	7058
	30	-1189	-871	-464	-166	124	2889	3559	4222	5101	5774
	35	-1315	-993	-581	-280	13	2417	2988	3552	4301	4873
	40	-1417	-1092	-676	-372	-77	2068	2566	3057	3708	4206
30	5	745	1111	1771	2483	3501	20055	24306	28523	34119	38401
	10	-70	169	515	851	1310	8358	10127	11873	14175	15928
	15	-438	-192	126	380	697	5225	6350	7459	8920	10031
	20	-676	-424	-99	-140	402	3762	4588	5401	6471	7285
	25	-846	-590	-260	-18	225	2916	3568	4210	5055	5697
	30	-975	-715	-382	-137	103	2366	2905	3435	4132	4662
	35	-1076	-815	-478	-231	11	1980	2439	2891	3484	3935
	40	-1159	-895	-557	-307	-64	1695	2095	2488	3005	3397
35	5	637	950	1515	2123	2992	16967	20514	24019	28647	32172
	10	-60	144	440	727	1120	7072	8548	9998	11900	13342
	15	-373	-163	107	324	595	4422	5361	6282	7490	8404
	20	-574	-360	-85	120	343	3185	3874	4550	5435	6104
	25	-717	-501	-222	-15	192	2469	3014	3547	4246	4774
	30	-826	-607	-325	-117	88	2003	2454	2894	3471	3908
	35	-911	-691	-407	-197	9	1677	2061	2436	2928	3299
	40	-980	-759	-473	-261	-54	1435	1770	2097	2525	2849
40	5	556	830	1323	1854	2612	14702	17745	20741	24684	27677
	10	-52	126	385	635	977	6129	7395	8633	10253	11476
	15	-324	-142	94	283	520	3832	4638	5425	6454	7229
	20	-498	-313	-74	104	300	2760	3352	3930	4684	5252
	25	-622	-435	-193	-13	167	2140	2608	3064	3660	4108
	30	-716	-527	-283	-102	77	1737	2123	2501	2993	3363
	35	-790	-600	-354	-171	8	1454	1784	2105	2524	2840
	40	-850	-658	-411	-228	-47	1245	1532	1812	2177	2452

TABLE F($s = 3$) (Continued)

n= 50		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
3	5	12319	17496	27419	38922	56872	769166	1185139	1771379	2932619	4240420
	10	1645	4640	9390	14500	22240	319990	493364	737655	1221507	1766402
	15	-4434	-206	3946	7506	12567	198840	307078	459580	761619	1101761
	20	-10409	-4431	876	4019	7929	142185	219987	329597	546682	791148
	25	-16100	-8456	-1672	1790	5168	109397	169586	254376	422298	611399
	30	-21437	-12230	-4059	59	3307	88072	136801	205443	341378	494455
	35	-26405	-15742	-6281	-1512	1933	73132	113829	171151	284664	412489
	40	-31012	-19000	-8341	-2969	834	62112	96880	145845	242805	351988
4	5	8779	12464	19425	27334	39364	391964	551606	751187	1095210	1434181
	10	1124	3240	6593	10134	15363	163402	230073	313375	456914	598316
	15	-2772	-137	2735	5218	8664	101862	143701	195971	286027	374740
	20	-6090	-2770	592	2775	5456	73090	103335	141114	206200	270312
	25	-8957	-5046	-1086	1222	3549	56438	79971	109383	159996	209869
	30	-11460	-7033	-2550	39	2264	45602	64766	88697	129919	170521
	35	-13665	-8783	-3839	-984	1317	38005	54103	74202	108820	142916
	40	-15622	-10336	-4984	-1893	563	32397	46228	63494	93230	122517
5	5	6833	9702	15079	21119	30177	257332	346730	451818	620613	775972
	10	854	2491	5089	7807	11763	107395	144754	188626	259041	323822
	15	-2014	-103	2095	4007	6625	67065	90583	118193	162502	203262
	20	-4286	-2013	447	2121	4167	48211	65269	85291	117419	146971
	25	-6156	-3585	-804	927	2707	37298	50615	66245	91320	114384
	30	-7731	-4910	-1857	29	1723	30194	41075	53843	74325	93163
	35	-9080	-6044	-2760	-729	999	25212	34383	45141	62397	78267
	40	-10251	-7029	-3543	-1388	425	21532	29437	38709	53578	67252
10	5	3253	4623	7152	9934	13997	91658	115192	140048	175413	204361
	10	388	1158	2387	3650	5442	38328	48156	58505	73192	85189
	15	-850	-45	967	1860	3057	24011	30237	36788	46081	53670
	20	-1718	-849	201	976	1917	17319	21865	26648	33430	38967
	25	-2376	-1459	-350	421	1241	13444	17018	20776	26104	30454
	30	-2899	-1943	-787	13	787	10920	13859	16950	21330	24905
	35	-3326	-2338	-1144	-318	453	9148	11642	14263	17976	21007
	40	-3684	-2669	-1443	-595	191	7838	10002	12274	15494	18121
15	5	2137	3038	4694	6504	9124	55300	68176	81346	99425	113718
	10	251	755	1560	2385	3544	23138	28509	33980	41461	47357
	15	-538	-29	629	1212	1989	14510	17919	21389	26131	29866
	20	-1073	-538	130	634	1246	10477	12972	15511	18979	21710
	25	-1469	-915	-223	272	806	8141	10107	12107	14837	16987
	30	-1778	-1209	-499	8	510	6619	8240	9888	12138	13908
	35	-2027	-1446	-721	-203	293	5551	6929	8329	10241	11745
	40	-2234	-1643	-905	-378	123	4761	5959	7176	8836	10142
20	5	1592	2263	3494	4836	6770	39538	48307	57139	69056	78323
	10	186	560	1159	1771	2629	16548	20203	23866	28786	32596
	15	-394	-22	466	899	1474	10382	12705	15030	18151	20566
	20	-780	-394	96	470	923	7500	9202	10906	13190	14958
	25	-1063	-666	-164	201	597	5831	7173	8517	10318	11711
	30	-1281	-877	-365	6	377	4743	5851	6960	8445	9594
	35	-1457	-1047	-526	-149	217	3980	4923	5866	7129	8106
	40	-1602	-1186	-659	-277	91	3415	4235	5056	6154	7003

TABLE F($s = 3$) (Continued)

n= 50		α									
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25	5	1268	1803	2783	3849	5382	30754	37380	43993	52826	59627
	10	147	445	922	1409	2089	12874	15634	18374	22014	24805
	15	-311	-17	370	715	1171	8079	9834	11575	13885	15654
	20	-613	-310	76	373	733	5838	7125	8401	10094	11389
	25	-832	-524	-130	160	474	4540	5556	6563	7898	8920
	30	-1002	-688	-288	5	299	3694	4534	5365	6466	7310
	35	-1137	-820	-415	-118	172	3100	3815	4523	5460	6178
	40	-1248	-928	-518	-219	72	2661	3283	3899	4715	5339
30	5	1054	1499	2313	3197	4466	25160	30476	35751	42749	48104
	10	122	369	766	1170	1733	10533	12747	14931	17812	20005
	15	-256	-14	307	593	972	6612	8020	9407	11236	12627
	20	-504	-256	63	309	608	4779	5812	6829	8170	9189
	25	-684	-432	-107	132	393	3717	4533	5336	6394	7198
	30	-822	-566	-238	4	248	3025	3699	4363	5236	5900
	35	-932	-674	-342	-98	142	2539	3114	3679	4422	4987
	40	-1022	-762	-427	-181	60	2180	2680	3172	3820	4311
35	5	901	1282	1978	2734	3817	21285	25721	30104	35891	40299
	10	104	316	655	1000	1481	8912	10758	12572	14952	16755
	15	-218	-12	262	507	830	5595	6770	7922	9433	10577
	20	-429	-218	54	264	520	4044	4907	5752	6860	7698
	25	-581	-367	-91	113	335	3146	3827	4495	5370	6031
	30	-697	-481	-202	3	212	2561	3124	3676	4398	4944
	35	-790	-572	-291	-83	122	2150	2630	3100	3715	4180
	40	-866	-646	-363	-154	51	1846	2264	2673	3209	3614
40	5	788	1120	1728	2388	3332	18444	22249	25995	30925	34668
	10	91	276	572	873	1293	7723	9306	10855	12882	14411
	15	-190	-10	229	443	725	4849	5856	6841	8128	9098
	20	-373	-190	47	231	454	3505	4245	4968	5911	6623
	25	-504	-319	-80	99	293	2727	3312	3883	4628	5189
	30	-605	-418	-176	3	185	2220	2703	3175	3791	4254
	35	-685	-497	-253	-72	106	1864	2276	2678	3202	3597
	40	-751	-561	-316	-134	44	1600	1960	2310	2767	3110
45	5	699	995	1535	2119	2957	16272	19601	22872	27164	30414
	10	80	244	507	775	1147	6813	8199	9551	11314	12641
	15	-168	-9	203	393	643	4278	5160	6020	7139	7981
	20	-330	-168	41	205	402	3093	3741	4371	5193	5810
	25	-446	-282	-71	87	260	2407	2918	3417	4065	4553
	30	-534	-370	-156	3	164	1959	2383	2795	3330	3733
	35	-605	-439	-224	-64	94	1645	2006	2357	2814	3157
	40	-663	-496	-280	-119	39	1413	1727	2033	2431	2730
50	5	629	895	1380	1905	2658	14557	17516	20417	24217	27088
	10	72	220	456	697	1031	6095	7327	8526	10088	11258
	15	-151	-8	183	353	578	3828	4611	5374	6365	7108
	20	-295	-151	37	184	362	2768	3343	3903	4630	5175
	25	-399	-253	-63	78	233	2153	2609	3051	3625	4055
	30	-479	-331	-140	2	147	1753	2130	2495	2970	3325
	35	-542	-393	-201	-58	84	1472	1793	2105	2509	2812
	40	-593	-444	-251	-107	35	1264	1544	1816	2168	2432

TABLE F($s = 3$) (Continued)

n= 60		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
3	5	15674	21811	33674	47479	69056	926427	1427152	2132833	3530668	5104925
	10	3645	6795	12249	18303	27577	387307	596850	892108	1476907	2135487
	15	-1609	1823	5967	10039	16036	241805	373116	558131	924568	1337232
	20	-6659	-1779	2680	5994	10527	173691	268410	401860	666163	963807
	25	-11581	-5260	349	3503	7267	134216	207733	311306	516431	747429
	30	-16290	-8590	-1757	1725	5092	108497	168200	252305	418870	606442
	35	-20752	-11745	-3753	275	3519	90444	140448	210885	350376	507457
	40	-24957	-14719	-5633	-1054	2308	77101	119932	180261	299730	434263
4	5	11204	15569	23883	33366	47815	471928	663963	904042	1317874	1725628
	10	2536	4779	8626	12813	19063	197591	278037	378553	551754	722378
	15	-1046	1247	4164	6998	11065	123677	174301	237547	346517	453863
	20	-4053	-1154	1845	4157	7253	89088	125774	171602	250559	328335
	25	-6700	-3255	234	2414	4999	69042	97653	133390	194957	255601
	30	-9049	-5119	-1140	1176	3497	55979	79327	108486	158717	208195
	35	-11147	-6785	-2367	184	2410	46807	66457	90994	133262	174893
	40	-13033	-8282	-3470	-691	1575	40024	56936	78053	114426	150250
5	5	8737	12134	18551	25789	36663	309763	417254	543611	746568	933369
	10	1946	3691	6671	9880	14602	129797	174829	227711	312591	390679
	15	-774	948	3203	5381	8467	81358	109767	143123	196852	245894
	20	-2907	-853	1408	3187	5544	58693	79338	103574	142464	178238
	25	-4690	-2353	176	1843	3817	45558	61705	80656	111065	139036
	30	-6214	-3635	-843	893	2667	36997	50211	65717	90596	113479
	35	-7536	-4746	-1727	139	1835	30984	42136	55222	76213	95520
	40	-8697	-5722	-2503	-514	1196	26536	36161	47453	65566	82224
10	5	4176	5796	8811	12141	17013	110288	138558	168416	210898	245670
	10	901	1731	3140	4628	6761	46277	58097	70545	88210	102640
	15	-337	432	1491	2507	3911	29083	36578	44466	55655	64793
	20	-1201	-371	645	1475	2555	21039	26517	32280	40454	47127
	25	-1864	-985	79	846	1755	16377	20686	25218	31645	36891
	30	-2396	-1477	-366	405	1223	13337	16883	20613	25900	30215
	35	-2836	-1884	-734	62	838	11201	14210	17375	21860	25521
	40	-3206	-2228	-1044	-225	544	9619	12231	14977	18867	22042
15	5	2747	3813	5786	7951	11092	66531	81993	97808	119517	136681
	10	586	1132	2055	3026	4405	27928	34383	40958	49949	57035
	15	-215	279	972	1636	2546	17566	21666	25839	31541	36033
	20	-756	-237	418	961	1662	12719	15721	18775	22948	26235
	25	-1162	-622	51	549	1141	9909	12275	14682	17969	20557
	30	-1481	-926	-234	262	794	8076	10028	12012	14721	16854
	35	-1741	-1174	-466	40	544	6788	8448	10134	12437	14250
	40	-1958	-1380	-659	-144	352	5835	7277	8743	10744	12319
20	5	2047	2841	4308	5913	8231	47565	58093	68697	83005	94130
	10	435	841	1528	2248	3268	19970	24361	28762	34672	39250
	15	-158	207	721	1214	1888	12566	15357	18152	21903	24806
	20	-552	-174	310	712	1232	9102	11148	13196	15943	18069
	25	-843	-455	37	407	845	7094	8708	10324	12490	14166
	30	-1071	-674	-172	194	588	5785	7117	8450	10237	11619
	35	-1255	-852	-341	29	402	4864	5998	7133	8653	9828
	40	-1408	-999	-482	-106	260	4183	5170	6156	7478	8501

TABLE F($s = 3$) (Continued)

n= 60		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
25	5	1631	2264	3432	4706	6543	38997	44951	52889	63493	71658
	10	345	669	1216	1789	2597	15535	18850	22141	26513	29865
	15	-125	164	573	966	1500	9777	11886	13976	16752	18878
	20	-434	-137	246	566	979	7084	8630	10163	12197	13755
	25	-662	-358	30	323	671	5523	6743	7953	9558	10787
	30	-839	-530	-136	154	467	4504	5513	6512	7836	8850
	35	-981	-669	-269	23	319	3789	4647	5498	6625	7488
	40	-1099	-783	-379	-84	206	3258	4006	4746	5728	6478
30	5	1356	1882	2852	3909	5430	30265	36647	42979	51380	57807
	10	286	555	1010	1485	2155	12709	15368	17990	21450	24084
	15	-103	136	476	801	1245	8000	9692	11358	13555	15226
	20	-358	-114	204	470	812	5797	7036	8261	9871	11096
	25	-545	-296	24	268	557	4520	5501	6466	7737	8703
	30	-689	-437	-112	127	387	3688	4497	5294	6344	7142
	35	-806	-550	-222	19	265	3102	3792	4471	5365	6044
	40	-901	-644	-313	-69	171	2668	3269	3861	4639	5230
35	5	1160	1611	2440	3343	4641	25604	30929	36189	43136	48428
	10	245	475	864	1270	1842	10753	12970	15147	18005	20171
	15	-88	116	407	685	1063	6769	8180	9564	11379	12753
	20	-305	-97	174	401	693	4906	5942	6957	8288	9295
	25	-463	-252	21	229	475	3826	4644	5446	6496	7291
	30	-585	-371	-96	109	330	3121	3797	4460	5328	5984
	35	-683	-468	-189	16	226	2626	3202	3767	4506	5065
	40	-764	-547	-266	-59	146	2259	2761	3253	3896	4383
40	5	1014	1407	2132	2920	4052	22186	26753	31249	37167	41660
	10	214	415	754	1109	1608	9318	11218	13079	15512	17348
	15	-77	101	355	598	928	5866	7076	8259	9804	10969
	20	-265	-84	152	350	605	4252	5140	6008	7141	7996
	25	-402	-219	18	200	415	3316	4018	4703	5598	6273
	30	-508	-323	-83	95	288	2706	3286	3852	4592	5149
	35	-593	-406	-165	14	197	2276	2771	3254	3883	4358
	40	-663	-475	-232	-52	127	1959	2390	2810	3359	3772
45	5	900	1250	1893	2592	3596	19573	23569	27494	32647	36547
	10	189	368	670	984	1427	8220	9883	11507	13624	15217
	15	-68	90	315	531	824	5176	6234	7267	8611	9622
	20	-235	-75	135	311	537	3752	4529	5287	6273	7014
	25	-356	-194	16	177	368	2926	3540	4139	4918	5503
	30	-449	-286	-74	84	256	2388	2896	3390	4034	4517
	35	-524	-359	-146	13	175	2009	2442	2864	3412	3824
	40	-585	-420	-205	-46	113	1729	2106	2473	2951	3310
50	5	810	1124	1702	2330	3232	17510	21062	24544	29105	32551
	10	170	331	602	885	1282	7354	8832	10272	12144	13551
	15	-61	81	283	477	740	4631	5572	6487	7677	8569
	20	-210	-67	121	279	483	3357	4048	4720	5592	6247
	25	-319	-174	14	159	331	2618	3164	3695	4385	4901
	30	-402	-256	-66	75	230	2136	2588	3027	3597	4024
	35	-469	-322	-131	11	157	1798	2183	2557	3042	3406
	40	-524	-376	-184	-41	101	1547	1883	2209	2631	2948

TABLE F($s = 3$) (Continued)

n= 60		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
55	5	736	1021	1546	2117	2935	15840	19036	22165	26255	29341
	10	155	300	547	803	1164	6653	7983	9276	10955	12213
	15	-55	73	257	433	672	4189	5036	5858	6925	7724
	20	-191	-61	110	254	438	3037	3659	4262	5045	5631
	25	-289	-158	13	144	300	2369	2860	3337	3956	4418
	30	-364	-232	-60	69	209	1933	2340	2734	3245	3627
	35	-425	-292	-119	10	143	1627	1973	2310	2745	3071
	40	-474	-341	-167	-37	92	1400	1702	1995	2374	2658
60	5	674	935	1416	1939	2688	14461	17366	20206	23914	26706
	10	142	275	501	736	1068	6074	7282	8456	9977	11116
	15	-51	67	235	397	615	3825	4594	5341	6307	7030
	20	-175	-56	101	232	401	2773	3338	3886	4595	5125
	25	-264	-144	12	132	275	2163	2610	3043	3603	4021
	30	-333	-212	-55	63	191	1765	2135	2493	2956	3302
	35	-388	-267	-109	9	131	1485	1801	2106	2500	2795
	40	-433	-312	-153	-34	84	1278	1553	1819	2163	2420

TABLE F($s = 3$) (Continued)

n= 80		α										
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
3	5	22252	30353	46130	64556	93399	1240976	1911221	2855810	4726882	6834103
	10	7029	10821	17837	25832	38205	522012	803934	1201182	1987991	2874069
	15	1926	4926	9759	14984	22912	327853	505376	755508	1250921	1808833
	20	-1874	1625	5749	9761	15650	236869	365511	546763	905747	1310017
	25	-5665	-1077	3220	6629	11378	184065	284348	425637	705469	1020598
	30	-9397	-3716	1339	4498	8549	149601	231376	346586	574761	831716
	35	-13025	-6281	-297	2914	6527	125360	194118	290983	482823	698859
	40	-16526	-8756	-1863	1645	5000	107402	166514	249787	414704	600420
4	5	15963	21718	32762	45405	64701	631871	888702	1209786	1763249	2308583
	10	4963	7668	12604	18117	26434	266008	374021	508984	741543	970644
	15	1320	3443	6855	10476	15830	167371	235586	320814	467662	612321
	20	-1214	1109	4010	6802	10798	121165	170765	232729	339490	444657
	25	-3488	-705	2224	4603	7842	94353	133154	181625	265135	347397
	30	-5553	-2345	910	3110	5885	76853	108608	148272	216607	283920
	35	-7437	-3840	-197	2003	4487	64544	91340	124809	182468	239262
	40	-9162	-5209	-1206	1121	3433	55422	78544	107421	157165	206163
5	5	12475	16951	25469	35113	49625	414637	558317	727216	998503	1248194
	10	3841	5949	9768	13987	20259	174627	235012	305926	419750	524467
	15	1005	2650	5293	8072	12122	109985	148189	193047	265039	331266
	20	-897	842	3083	5230	8262	79710	107545	140225	192668	240910
	25	-2516	-525	1700	3531	5995	62142	83964	109581	150688	188500
	30	-3927	-1711	690	2379	4496	50676	68573	89580	123288	154293
	35	-5174	-2760	-148	1527	3425	42610	57745	75508	104009	130224
	40	-6287	-3695	-892	851	2618	36632	49719	65077	89718	112381
10	5	5990	8122	12117	16548	23041	147551	185294	225157	281873	328297
	10	1808	2816	4617	6568	9392	62184	77990	94636	118260	137558
	15	458	1234	2484	3775	5609	39239	49275	59838	74824	87062
	20	-389	383	1434	2436	3816	28496	35839	43567	54527	63476
	25	-1049	-230	782	1637	2765	22262	28044	34128	42755	49799
	30	-1586	-727	312	1097	2070	18193	22956	27967	35071	40871
	35	-2036	-1144	-65	699	1574	15330	19375	23630	29663	34587
	40	-2421	-1500	-387	386	1200	13207	16720	20415	25652	29927
15	5	3946	5347	7962	10841	15025	88996	109630	130735	159705	182610
	10	1183	1846	3027	4297	6121	37513	46136	54920	66932	76399
	15	297	805	1624	2467	3654	23686	29167	34747	42372	48379
	20	-248	247	935	1589	2484	17212	21228	25316	30901	35299
	25	-662	-147	508	1066	1799	13456	16623	19846	24248	27715
	30	-993	-462	202	713	1346	11003	13616	16275	19905	22764
	35	-1265	-721	-42	453	1022	9278	11500	13761	16848	19279
	40	-1495	-940	-247	249	779	7998	9931	11897	14581	16694
20	5	2943	3987	5930	8063	11150	63620	77667	91815	110904	125748
	10	879	1373	2252	3194	4542	26819	32682	38558	46450	52563
	15	219	597	1207	1832	2710	16938	20667	24402	29413	33293
	20	-182	183	694	1180	1842	12313	15047	17785	21458	24300
	25	-484	-108	376	791	1333	9629	11787	13947	16844	19086
	30	-722	-338	149	528	997	7876	9658	11441	13832	15682
	35	-918	-526	-31	335	757	6643	8160	9677	11712	13286
	40	-1081	-684	-181	184	577	5729	7049	8369	10140	11509

TABLE F($s = 3$) (Continued)

n= 80		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
25	5	2346	3179	4725	6419	8865	49482	60093	70683	84829	95721
	10	700	1094	1793	2542	3610	20860	25285	29678	35514	39988
	15	174	475	960	1457	2154	13177	15992	18785	22492	25331
	20	-144	145	551	938	1464	9581	11646	13694	16412	18493
	25	-381	-86	298	628	1059	7493	9124	10741	12886	14528
	30	-568	-267	118	420	792	6131	7478	8813	10584	11940
	35	-720	-415	-24	266	601	5172	6319	7456	8964	10118
	40	-847	-538	-143	146	458	4461	5460	6449	7762	8766
30	5	1951	2643	3927	5332	7357	40478	48991	57436	68642	77216
	10	581	908	1490	2111	2996	17065	20612	24112	28729	32245
	15	144	394	797	1210	1787	10781	13039	15264	18196	20428
	20	-119	120	457	778	1214	7839	9496	11128	13279	14915
	25	-314	-71	247	521	879	6132	7441	8730	10428	11719
	30	-468	-220	98	348	657	5018	6099	7164	8566	9632
	35	-592	-342	-20	221	499	4234	5155	6062	7256	8164
	40	-696	-443	-118	121	380	3652	4454	5244	6284	7074
35	5	1670	2262	3360	4560	6288	34243	41346	48362	57628	64686
	10	497	777	1274	1805	2560	14437	17395	20300	24114	27004
	15	123	337	682	1034	1527	9121	11004	12852	15274	17108
	20	-102	103	391	665	1038	6633	8015	9371	11148	12492
	25	-268	-60	211	446	751	5189	6281	7352	8755	9816
	30	-397	-188	83	297	561	4247	5149	6034	7193	8070
	35	-503	-291	-17	188	426	3583	4352	5106	6093	6840
	40	-591	-377	-101	103	324	3091	3761	4417	5277	5927
40	5	1459	1977	2936	3983	5490	29671	35762	41759	49652	55644
	10	434	679	1113	1577	2235	12509	15045	17527	20774	23224
	15	107	294	595	903	1333	7904	9518	11097	13159	14714
	20	-88	89	341	581	906	5748	6934	8092	9604	10745
	25	-233	-53	184	389	655	4497	5434	6349	7543	8444
	30	-346	-163	73	259	490	3681	4455	5211	6198	6942
	35	-437	-253	-15	164	372	3106	3766	4410	5251	5884
	40	-513	-328	-88	90	283	2679	3254	3816	4548	5100
45	5	1296	1755	2607	3536	4872	26176	31506	36741	43612	48815
	10	385	603	988	1399	1983	11036	13254	15420	18244	20370
	15	95	261	528	802	1183	6973	8386	9763	11557	12906
	20	-78	79	303	516	804	5072	6109	7120	8436	9425
	25	-206	-47	164	345	581	3968	4788	5586	6626	7407
	30	-306	-145	65	230	434	3248	3925	4585	5444	6090
	35	-386	-224	-13	146	330	2741	3318	3881	4613	5163
	40	-453	-290	-78	80	251	2365	2868	3358	3995	4474
50	5	1166	1579	2344	3179	4379	23417	28154	32798	38881	43476
	10	346	542	888	1258	1783	9873	11844	13764	16263	18140
	15	86	234	475	721	1063	6239	7494	8715	10302	11493
	20	-70	71	272	463	722	4538	5459	6356	7520	8394
	25	-185	-42	147	310	522	3550	4279	4987	5907	6597
	30	-274	-130	58	207	390	2906	3508	4094	4854	5424
	35	-346	-201	-12	131	296	2452	2966	3465	4113	4598
	40	-406	-260	-70	72	226	2118	2563	2998	3562	3986

TABLE F($s = 3$) (Continued)

n= 80		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
55	5	1059	1434	2129	2888	3976	21183	25446	29619	35074	39188
	10	314	492	807	1143	1619	8931	10705	12430	14669	16349
	15	78	213	431	654	965	5644	6773	7870	9293	10359
	20	-64	65	247	421	656	4105	4934	5740	6784	7565
	25	-168	-38	133	282	474	3212	3868	4504	5329	5946
	30	-248	-118	53	188	354	2629	3171	3697	4379	4889
	35	-314	-182	-11	119	269	2219	2681	3129	3710	4145
	40	-368	-236	-63	65	205	1914	2317	2708	3214	3593
60	5	970	1314	1951	2645	3642	19339	23213	27001	31945	35669
	10	288	451	739	1047	1483	8154	9765	11331	13360	14879
	15	71	195	395	599	884	5153	6179	7174	8464	9428
	20	-58	59	226	385	601	3748	4502	5232	6178	6886
	25	-153	-35	122	258	434	2933	3529	4106	4853	5412
	30	-227	-108	48	172	325	2400	2893	3371	3988	4450
	35	-287	-167	-10	109	246	2026	2446	2853	3379	3773
	40	-336	-215	-58	60	187	1748	2114	2469	2928	3270
65	5	895	1213	1800	2440	3359	17790	21341	24808	29329	32730
	10	266	416	682	965	1367	7500	8978	10410	12285	13651
	15	66	180	364	553	815	4740	5681	6592	7770	8650
	20	-54	55	209	355	554	3448	4139	4808	5672	6318
	25	-141	-32	113	238	401	2698	3244	3773	4456	4966
	30	-209	-99	44	159	299	2208	2660	3097	3662	4083
	35	-264	-153	-9	100	227	1864	2249	2621	3103	3462
	40	-310	-198	-54	55	173	1608	1944	2269	2688	3001
70	5	831	1126	1671	2265	3117	16470	19747	22944	27108	30237
	10	247	386	633	896	1269	6944	8307	9628	11336	12611
	15	61	167	338	513	757	4389	5256	6096	7181	7991
	20	-50	51	194	330	514	3192	3830	4446	5243	5836
	25	-131	-30	105	221	372	2498	3002	3489	4119	4588
	30	-194	-92	41	147	278	2045	2462	2865	3385	3772
	35	-245	-142	-8	93	211	1726	2081	2425	2868	3198
	40	-287	-184	-50	51	160	1489	1799	2098	2485	2773
75	5	775	1050	1559	2113	2908	15333	18375	21341	25200	28097
	10	230	360	590	836	1184	6465	7730	8955	10537	11718
	15	57	156	316	479	706	4086	4891	5670	6676	7425
	20	-47	47	181	308	479	2972	3564	4136	4874	5423
	25	-122	-28	98	206	347	2326	2794	3246	3829	4263
	30	-181	-86	38	137	259	1904	2291	2664	3146	3505
	35	-228	-133	-8	87	197	1607	1937	2255	2666	2972
	40	-267	-171	-46	48	150	1386	1674	1952	2310	2576
80	5	727	984	1461	1980	2725	14343	17182	19947	23542	26240
	10	216	337	553	783	1109	6047	7228	8370	9844	10942
	15	53	146	296	449	661	3822	4574	5300	6236	6934
	20	-44	44	169	288	449	2780	3332	3866	4553	5064
	25	-114	-26	91	193	325	2176	2612	3034	3577	3981
	30	-169	-80	36	129	243	1781	2142	2491	2940	3274
	35	-213	-124	-7	81	184	1503	1811	2108	2491	2776
	40	-250	-161	-43	45	140	1297	1566	1825	2158	2406

TABLE F($s = 3$) (Continued)

n= 100		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
3	5	28750	38839	58551	81609	117727	1555543	2395319	3578833	5923172	8563392
	10	10122	14686	23339	33307	48799	656762	1011092	1510368	2499262	3612921
	15	4383	7643	13404	19847	29744	413977	637756	953066	1577574	2280870
	20	993	4001	8570	13416	20720	300155	462780	691917	1145744	1656824
	25	-2032	1508	5623	9600	15428	234054	361177	540287	895029	1294520
	30	-5065	-653	3564	7042	11935	190875	294811	441249	731275	1057887
	35	-8068	-2776	1969	5183	9448	160475	248087	371522	615988	891290
	40	-11012	-4857	604	3749	7581	137927	213433	319806	530479	767723
4	5	20666	27828	41617	57429	81577	791826	1113456	1515552	2208655	2891579
	10	7193	10446	16524	23387	33784	334452	470042	639466	931406	1219005
	15	3063	5387	9448	13901	20567	211105	296930	404159	588919	770926
	20	673	2785	6011	9373	14311	153298	215832	293959	428569	561171
	25	-1312	1029	3920	6689	10645	119733	168751	229987	335494	439425
	30	-3142	-431	2466	4893	8227	97809	138000	188206	274706	359913
	35	-4834	-1774	1348	3589	6507	82374	116350	158790	231908	303932
	40	-6405	-3021	407	2586	5216	70925	100291	136970	200161	262405
5	5	16170	21738	32369	44425	62580	519519	699391	910833	1250455	1563042
	10	5589	8123	12822	18067	25902	219475	295219	384172	526950	658305
	15	2357	4166	7311	10723	15757	138639	186647	243017	333486	416712
	20	509	2138	4637	7218	10956	100762	135798	176934	242950	303678
	25	-969	780	3014	5143	8144	78771	106280	138577	190405	238080
	30	-2274	-321	1887	3755	6291	64407	87001	113525	156088	195239
	35	-3442	-1303	1025	2749	4972	54293	73427	95886	131925	165075
	40	-4495	-2189	307	1975	3983	46791	63357	82801	114000	142696
10	5	7783	10433	15416	20949	29065	184817	232034	281901	352852	410928
	10	2652	3863	6076	8497	12017	78097	97890	118736	148319	172487
	15	1096	1959	3445	5027	7299	49405	61983	75223	94007	109346
	20	229	990	2172	3373	5068	35965	45175	54869	68618	79845
	25	-420	354	1401	2395	3762	28162	35420	43057	53887	62731
	30	-953	-142	869	1742	2902	23066	29048	35341	44267	51554
	35	-1405	-559	467	1270	2290	19477	24560	29909	37492	43683
	40	-1794	-920	137	908	1832	16814	21231	25877	32465	37842
15	5	5132	6874	10132	13727	18956	111462	137268	163663	199896	228542
	10	1740	2537	3987	5562	7834	47102	57893	68887	83920	95768
	15	715	1282	2256	3287	4756	29811	36674	43661	53211	60733
	20	148	645	1419	2203	3300	21712	26744	31865	38862	44373
	25	-268	229	913	1562	2449	17011	20980	25020	30538	34884
	30	-603	-91	565	1135	1888	13939	17215	20549	25102	28687
	35	-882	-356	302	826	1489	11777	14564	17400	21273	24323
	40	-1119	-582	89	590	1191	10172	12597	15063	18432	21084
20	5	3829	5126	7548	10211	14068	79676	97242	114934	138805	157367
	10	1295	1889	2967	4135	5813	33670	41005	48357	58231	65879
	15	530	952	1678	2442	3528	21315	25981	30656	36929	41785
	20	109	478	1054	1636	2448	15528	18952	22379	26978	30537
	25	-197	169	678	1160	1816	12169	14871	17577	21206	24014
	30	-441	-67	419	842	1399	9974	12206	14440	17436	19754
	35	-642	-261	223	612	1104	8429	10329	12231	14781	16754
	40	-813	-426	65	437	882	7282	8936	10591	12810	14527

TABLE F($s = 3$) (Continued)

n= 100		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
25	5	3054	4088	6015	8130	11185	61968	75236	88478	106166	119786
	10	1031	1505	2363	3291	4621	26187	31722	37217	44518	50115
	15	421	758	1335	1943	2804	16580	20102	23596	28235	31788
	20	87	380	838	1301	1945	12081	14665	17228	20630	23235
	25	-155	134	539	922	1443	9469	11510	13533	16219	18275
	30	-347	-53	332	669	1112	7762	9449	11120	13338	15036
	35	-505	-206	177	487	877	6561	7997	9420	11309	12754
	40	-638	-335	52	347	701	5669	6920	8159	9803	11061
30	5	2540	3399	4999	6753	9283	50691	61335	71895	85906	96626
	10	857	1251	1964	2734	3835	21422	25859	30236	36011	40408
	15	350	629	1109	1614	2327	13564	16388	19172	22841	25632
	20	72	315	696	1080	1614	9884	11957	13999	16691	18738
	25	-128	111	447	765	1197	7748	9385	10998	13123	14739
	30	-287	-44	276	555	922	6352	7705	9038	10793	12128
	35	-416	-170	147	404	727	5369	6522	7657	9152	10289
	40	-525	-277	43	288	581	4640	5644	6633	7935	8924
35	5	2174	2909	4277	5776	7934	42883	51763	60535	72120	80944
	10	733	1070	1680	2338	3278	18122	21822	25455	30225	33839
	15	299	538	948	1380	1988	11475	13831	16141	19172	21466
	20	61	269	595	923	1379	8363	10092	11787	14011	15693
	25	-109	95	382	654	1023	6556	7922	9261	11017	12345
	30	-244	-37	235	474	788	5375	6504	7611	9062	10159
	35	-354	-145	125	345	621	4544	5506	6449	7685	8619
	40	-446	-236	37	246	496	3927	4765	5586	6663	7477
40	5	1900	2543	3738	5045	6927	37157	44772	52270	62138	69629
	10	640	935	1467	2042	2862	15702	18874	21977	26037	29101
	15	261	470	828	1205	1736	9944	11963	13937	16516	18461
	20	53	235	520	806	1204	7247	8729	10178	12070	13497
	25	-95	83	333	571	893	5681	6853	7997	9492	10618
	30	-212	-32	206	414	688	4659	5627	6573	7808	8739
	35	-308	-126	109	301	542	3938	4763	5569	6622	7415
	40	-388	-205	32	214	433	3404	4123	4825	5741	6432
45	5	1688	2258	3319	4479	6147	32779	39443	45988	54579	61083
	10	568	830	1303	1812	2539	13852	16627	19335	22866	25525
	15	231	417	735	1069	1540	8772	10539	12261	14505	16192
	20	47	208	461	716	1068	6394	7690	8955	10601	11839
	25	-84	73	296	507	792	5013	6037	7036	8337	9314
	30	-188	-29	182	367	610	4110	4958	5783	6858	7666
	35	-273	-112	97	267	481	3475	4197	4901	5816	6505
	40	-343	-182	28	190	384	3003	3633	4246	5043	5643
50	5	1518	2031	2985	4027	5525	29324	35246	41052	48657	54402
	10	511	746	1171	1629	2282	12392	14857	17258	20383	22729
	15	208	375	661	961	1384	7848	9417	10945	12930	14419
	20	42	187	415	643	960	5720	6873	7994	9450	10543
	25	-76	66	266	455	712	4485	5395	6281	7432	8295
	30	-169	-26	164	330	548	3678	4431	5163	6114	6827
	35	-244	-100	87	240	432	3109	3751	4375	5185	5793
	40	-308	-163	25	171	345	2687	3247	3791	4496	5026

TABLE F($s = 3$) (Continued)

n= 100		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
55	5	1379	1845	2711	3658	5018	26527	31856	37073	43892	49036
	10	464	678	1064	1480	2073	11210	13428	15585	18385	20485
	15	189	340	600	873	1257	7100	8512	9883	11663	12996
	20	39	170	377	584	872	5175	6212	7219	8524	9502
	25	-69	60	241	414	646	4057	4877	5672	6704	7476
	30	-153	-23	149	300	498	3327	4005	4663	5515	6153
	35	-222	-91	79	218	393	2813	3391	3951	4678	5222
	40	-279	-148	23	155	314	2431	2935	3423	4056	4530
60	5	1264	1691	2484	3351	4595	24217	29061	33796	39977	44633
	10	425	621	975	1356	1898	10234	12249	14206	16744	18643
	15	173	312	550	800	1151	6482	7765	9010	10622	11827
	20	35	156	345	535	798	4724	5667	6581	7764	8648
	25	-63	55	221	379	592	3704	4449	5171	6106	6804
	30	-140	-21	136	275	456	3038	3654	4251	5023	5601
	35	-203	-83	72	199	359	2568	3093	3602	4261	4753
	40	-255	-135	21	142	287	2220	2678	3121	3695	4123
65	5	1166	1560	2292	3091	4239	22277	26716	31051	36702	40954
	10	392	573	899	1251	1751	9414	11261	13052	15371	17105
	15	160	288	507	738	1062	5962	7138	8278	9751	10852
	20	33	144	318	494	736	4346	5210	6046	7127	7935
	25	-58	50	204	349	546	3408	4090	4751	5606	6243
	30	-129	-20	126	253	421	2795	3359	3906	4612	5139
	35	-187	-77	67	184	332	2363	2844	3310	3912	4361
	40	-235	-124	19	131	265	2042	2462	2868	3392	3784
70	5	1083	1448	2127	2869	3933	20625	24722	28718	33923	37835
	10	364	532	835	1161	1625	8716	10420	12071	14206	15801
	15	148	267	471	685	985	5520	6605	7656	9012	10024
	20	30	133	295	458	683	4024	4821	5592	6587	7330
	25	-54	47	189	324	507	3155	3785	4394	5181	5768
	30	-119	-18	117	235	390	2587	3108	3612	4263	4747
	35	-173	-71	62	171	308	2188	2632	3061	3616	4029
	40	-218	-115	18	122	246	1891	2278	2653	3136	3495
75	5	1010	1351	1985	2676	3669	19201	23004	26711	31535	35157
	10	340	496	779	1083	1515	8114	9696	11227	13205	14681
	15	138	249	439	639	919	5139	6146	7120	8377	9314
	20	28	124	275	427	637	3746	4486	5201	6124	6811
	25	-50	44	177	302	472	2937	3522	4087	4816	5359
	30	-111	-17	109	219	364	2409	2893	3360	3962	4411
	35	-161	-66	58	159	287	2037	2449	2848	3361	3744
	40	-203	-108	17	113	229	1761	2120	2467	2915	3248
80	5	947	1266	1860	2508	3438	17961	21510	24966	29461	32833
	10	318	465	730	1015	1420	7590	9066	10493	12336	13710
	15	129	233	412	599	861	4807	5747	6655	7826	8698
	20	26	116	258	400	597	3504	4195	4861	5721	6360
	25	-47	41	165	283	443	2748	3293	3820	4499	5005
	30	-104	-16	102	205	341	2253	2705	3140	3702	4120
	35	-151	-62	54	149	269	1905	2290	2662	3140	3496
	40	-190	-101	16	106	215	1647	1983	2306	2723	3033

TABLE F($s = 3$) (Continued)

n= 100		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
85	5	891	1192	1750	2360	3234	16871	20197	23435	27842	30797
	10	300	438	687	955	1336	7130	8513	9850	11574	12859
	15	122	220	387	563	810	4516	5396	6247	7343	8158
	20	25	110	243	377	562	3292	3939	4563	5367	5966
	25	-44	38	156	267	416	2581	3093	3586	4222	4694
	30	-98	-15	96	193	321	2117	2540	2948	3473	3864
	35	-142	-58	51	140	253	1790	2151	2499	2946	3279
	40	-178	-95	15	100	202	1547	1862	2165	2555	2845
90	5	841	1125	1653	2228	3054	15906	19036	22081	26035	28998
	10	283	413	648	901	1261	6722	8023	9280	10901	12108
	15	115	207	366	532	765	4257	5086	5886	6916	7681
	20	23	103	229	356	530	3103	3712	4299	5055	5617
	25	-42	36	147	252	393	2433	2915	3379	3976	4420
	30	-93	-14	90	182	303	1996	2394	2778	3271	3638
	35	-134	-55	48	132	239	1688	2027	2354	2775	3088
	40	-168	-89	14	94	191	1459	1755	2040	2407	2679
95	5	797	1066	1565	2110	2892	15045	18001	20875	24605	27398
	10	268	391	614	854	1194	6358	7587	8773	10302	11439
	15	109	196	346	503	724	4027	4810	5564	6535	7257
	20	22	98	217	337	502	2936	3510	4065	4777	5307
	25	-39	34	139	238	372	2302	2756	3194	3758	4176
	30	-88	-13	86	173	287	1888	2264	2626	3092	3437
	35	-127	-52	45	125	226	1596	1917	2226	2623	2917
	40	-159	-85	13	89	181	1380	1659	1929	2274	2531
100	5	757	1012	1487	2004	2746	14273	17073	19794	23323	25965
	10	254	372	583	811	1134	6032	7196	8319	9765	10840
	15	103	186	329	478	688	3820	4562	5276	6195	6877
	20	21	93	206	320	477	2785	3329	3854	4528	5029
	25	-37	33	132	226	354	2184	2614	3029	3562	3958
	30	-83	-13	81	164	272	1791	2147	2490	2931	3258
	35	-120	-50	43	119	215	1514	1818	2110	2486	2765
	40	-151	-80	13	85	171	1309	1574	1829	2156	2399

H.3 TABLE F($s = 4$): Two-Parameter Exponential Quantiles for Future Samples

n= 5		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
3	5	-11822	-5430	241	3282	6599	111028	171376	256404	424810	614463
	10	-45470	-29223	-14807	-7541	-2403	33580	52500	79122	131817	191147
	15	-65064	-43079	-23570	-13737	-6785	17724	28148	42799	71781	104406
	20	-77522	-51887	-29141	-17677	-9570	11202	18080	27733	46818	68296
	25	-86083	-57941	-32970	-20384	-11485	7785	12772	19761	33570	49107
	30	-92313	-62346	-35756	-22354	-12878	5740	9577	14944	25541	37462
	35	-97045	-65692	-37872	-23851	-13936	4409	7483	11774	20243	29767
	40	-100759	-68318	-39533	-25025	-14766	3489	6025	9561	16532	24369
4	5	-6824	-3353	161	2274	4569	56847	80124	109209	159333	208715
	10	-21336	-14871	-8325	-4545	-1544	17649	25213	34638	50852	66813
	15	-28337	-20428	-12420	-7795	-4124	9551	13877	19254	28496	37588
	20	-32470	-23708	-14836	-9713	-5646	6166	9114	12769	19044	25213
	25	-35196	-25872	-16431	-10978	-6650	4364	6562	9281	13942	18523
	30	-37129	-27406	-17561	-11875	-7362	3269	5002	7140	10801	14397
	35	-38571	-28551	-18404	-12545	-7894	2547	3966	5712	8698	11629
	40	-39688	-29437	-19058	-13063	-8305	2040	3235	4701	7205	9661
5	5	-4772	-2422	121	1742	3502	37402	50460	65800	90433	113101
	10	-13552	-9805	-5750	-3244	-1137	11769	16092	21148	29244	36682
	15	-17398	-13039	-8322	-5407	-2956	6449	8973	11915	16618	20936
	20	-19584	-14877	-9784	-6636	-3989	4208	5958	7993	11238	14215
	25	-20997	-16065	-10729	-7431	-4658	3006	4331	5866	8311	10552
	30	-21986	-16897	-11391	-7987	-5125	2270	3328	4551	6495	8275
	35	-22718	-17512	-11880	-8399	-5471	1780	2658	3667	5270	6737
	40	-23280	-17985	-12256	-8715	-5737	1435	2182	3038	4395	5636

TABLE F($s = 4$) (Continued)

n= 6		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
3	5	-7408	-2309	2253	5209	8961	136241	209983	313889	519690	751456
	10	-38038	-23968	-11483	-5191	-742	42397	65998	99216	164977	239019
	15	-57538	-37757	-20204	-11357	-5102	22797	35948	54440	91031	132224
	20	-70508	-46928	-26004	-15459	-8002	14611	23348	35621	59894	87215
	25	-79670	-53406	-30102	-18356	-10051	10270	16635	25565	43217	63082
	30	-86461	-58209	-33139	-20504	-11569	7649	12561	19442	33039	48337
	35	-91689	-61905	-35477	-22157	-12738	5929	9873	15390	26286	38542
	40	-95834	-64836	-37330	-23468	-13665	4732	7992	12546	21534	31643
4	5	-4471	-1486	1553	3637	6214	69559	97870	133250	194222	254294
	10	-18470	-12597	-6650	-3215	-489	22114	31441	43067	63075	82774
	15	-25730	-18359	-10895	-6584	-3163	12154	17524	24206	35694	46999
	20	-30169	-21882	-13491	-8645	-4798	7942	11614	16176	24011	31718
	25	-33162	-24257	-15241	-10034	-5901	5677	8422	11825	17664	23404
	30	-35314	-25966	-16500	-11033	-6694	4292	6459	9140	13735	18251
	35	-36937	-27254	-17449	-11786	-7292	3371	5148	7340	11094	14782
	40	-38204	-28260	-18190	-12374	-7758	2723	4219	6061	9213	12307
5	5	-3194	-1095	1185	2799	4769	45696	61534	80142	110023	137523
	10	-11918	-8430	-4657	-2325	-364	14688	19984	26182	36110	45233
	15	-15988	-11853	-7379	-4614	-2289	8163	11268	14893	20691	26015
	20	-18374	-13860	-8975	-5956	-3417	5386	7544	10057	14070	17753
	25	-19945	-15181	-10025	-6839	-4160	3883	5518	7418	10448	13226
	30	-21058	-16117	-10770	-7465	-4687	2957	4265	5779	8191	10402
	35	-21889	-16815	-11325	-7932	-5079	2338	3422	4674	6664	8488
	40	-22532	-17356	-11756	-8294	-5383	1900	2822	3884	5571	7114
6	5	-2482	-867	959	2276	3873	33764	44309	56239	74590	90791
	10	-8734	-6309	-3578	-1820	-290	10927	14484	18488	24624	30028
	15	-11469	-8690	-5561	-3546	-1793	6114	8224	10592	14214	17401
	20	-13032	-10051	-6693	-4532	-2651	4058	5539	7197	9728	11953
	25	-14047	-10934	-7429	-5173	-3208	2940	4073	5337	7264	8956
	30	-14759	-11554	-7945	-5622	-3600	2250	3162	4177	5722	7078
	35	-15288	-12014	-8328	-5955	-3890	1786	2548	3392	4676	5801
	40	-15695	-12369	-8623	-6212	-4114	1456	2109	2830	3923	4882

TABLE F($s = 4$) (Continued)

n= 7		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
3	5	-4213	-50	3907	7031	11288	161534	248714	371556	614867	888878
	10	-32008	-19704	-8787	-3284	607	51378	79734	119655	198690	287682
	15	-51091	-33198	-17321	-9319	-3660	28041	43993	66432	110842	160839
	20	-64306	-42542	-23231	-13498	-6615	18175	28839	43827	73477	106853
	25	-73878	-49311	-27512	-16525	-8756	12893	20694	31648	53310	77689
	30	-81098	-54416	-30740	-18808	-10370	9679	15717	24186	40927	59766
	35	-86726	-58395	-33257	-20587	-11629	7556	12415	19222	32672	47805
	40	-91230	-61580	-35271	-22012	-12636	6070	10093	15723	26841	39348
4	5	-2641	-34	2729	4929	7836	82311	115670	157361	229212	300003
	10	-16035	-10664	-5225	-2084	409	26649	37760	51615	75463	98944
	15	-23418	-16524	-9543	-5511	-2311	14829	21264	29275	43055	56616
	20	-28079	-20223	-12269	-7675	-4028	9782	14199	19690	29125	38409
	25	-31283	-22766	-14142	-9162	-5209	7049	10357	14464	21514	28449
	30	-33619	-24620	-15508	-10246	-6069	5366	7982	11223	16784	22250
	35	-35397	-26032	-16548	-11071	-6724	4242	6388	9042	13592	18063
	40	-36796	-27142	-17366	-11721	-7240	3447	5256	7489	11312	15069
5	5	-1922	-25	2099	3803	6017	54014	72639	94523	129666	162009
	10	-10496	-7235	-3706	-1526	308	17650	23928	31279	43056	53881
	15	-14717	-10784	-6529	-3899	-1688	9919	13614	17932	24841	31187
	20	-17259	-12922	-8229	-5329	-2890	6602	9175	12176	16973	21376
	25	-18962	-14354	-9368	-6286	-3695	4794	6748	9020	12648	15976
	30	-20182	-15380	-10184	-6973	-4272	3676	5238	7051	9943	12595
	35	-21101	-16153	-10798	-7489	-4707	2924	4219	5719	8109	10298
	40	-21817	-16755	-11277	-7892	-5045	2390	3492	4765	6791	8648
7	5	-1243	-17	1438	2616	4120	31504	40590	50610	65583	78437
	10	-6135	-4375	-2339	-993	206	10393	13491	16887	21940	26265
	15	-8281	-6286	-3980	-2454	-1096	5901	7757	9786	12799	15376
	20	-9514	-7385	-4923	-3295	-1844	3963	5276	6709	8832	10645
	25	-10318	-8101	-5538	-3843	-2332	2901	3912	5011	6638	8026
	30	-10885	-8607	-5971	-4229	-2676	2240	3059	3947	5258	6377
	35	-11307	-8982	-6294	-4516	-2932	1793	2480	3222	4317	5250
	40	-11632	-9272	-6543	-4738	-3130	1474	2064	2701	3638	4436

TABLE F($s = 4$) (Continued)

n= 8		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
3	5	-1826	1646	5409	8797	13591	186877	287521	429338	710233	1026571
	10	-27048	-16197	-6568	-1716	1744	60471	93637	140334	232791	336897
	15	-45525	-29262	-14831	-7558	-2416	33410	52220	78686	131071	190050
	20	-58794	-38645	-20766	-11755	-5383	21859	34503	52280	87455	127053
	25	-68631	-45600	-25165	-14865	-7582	15625	24911	37956	63759	92803
	30	-76170	-50932	-28537	-17249	-9268	11806	19014	29131	49135	71647
	35	-82117	-55137	-31196	-19130	-10598	9270	15083	23233	39343	57472
	40	-86920	-58533	-33344	-20649	-11672	7487	12308	19061	32404	47415
4	5	-1183	1127	3805	6183	9442	95088	133505	181519	264268	345797
	10	-13943	-9003	-4002	-1113	1191	31234	44144	60247	87968	115263
	15	-21356	-14888	-8337	-4554	-1552	17557	25072	34433	50537	66388
	20	-26172	-18709	-11153	-6789	-3326	11673	16848	23286	34353	45243
	25	-29542	-21385	-13124	-8354	-4567	8466	12351	17177	25468	33624
	30	-32031	-23360	-14580	-9509	-5484	6482	9558	13374	19925	26366
	35	-33943	-24878	-15698	-10397	-6189	5151	7677	10806	16174	21450
	40	-35458	-26080	-16584	-11100	-6747	4205	6336	8971	13487	17925
5	5	-875	857	2940	4779	7255	62349	83765	108930	149343	186536
	10	-9248	-6185	-2872	-824	905	20640	27908	36420	50061	62598
	15	-13564	-9815	-5758	-3251	-1143	11706	15998	21017	29051	36431
	20	-16229	-12056	-7540	-4749	-2403	7847	10842	14339	19930	25064
	25	-18041	-13580	-8752	-5769	-3260	5733	8009	10661	14897	18785
	30	-19355	-14684	-9631	-6507	-3881	4418	6240	8359	11741	14842
	35	-20351	-15522	-10297	-7067	-4352	3532	5043	6797	9593	12157
	40	-21132	-16179	-10819	-7507	-4721	2899	4186	5676	8048	10222
8	5	-491	499	1752	2852	4297	29964	38104	46915	59811	70661
	10	-4538	-3167	-1552	-463	526	10024	12817	15821	20195	23862
	15	-6320	-4781	-2968	-1745	-638	5753	7438	9245	11872	14071
	20	-7350	-5714	-3786	-2487	-1309	3898	5097	6379	8240	9797
	25	-8025	-6326	-4323	-2973	-1750	2875	3802	4791	6224	7421
	30	-8503	-6759	-4703	-3316	-2061	2235	2989	3791	4950	5919
	35	-8859	-7081	-4986	-3573	-2293	1801	2435	3107	4079	4889
	40	-9135	-7331	-5205	-3771	-2473	1489	2035	2614	3448	4143

TABLE F($s = 4$) (Continued)

n= 9		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
3	5	5	3021	6832	10528	15877	212253	326379	487195	805723	1164444
	10	-22918	-13277	-4721	-410	2777	69646	107659	161186	267170	386511
	15	-40687	-25841	-12668	-6029	-1334	38874	60585	91139	151620	219716
	20	-53874	-35165	-18565	-10199	-4283	25638	40303	60928	101745	147696
	25	-63861	-42227	-23032	-13357	-6516	18446	29255	44446	74499	108329
	30	-71632	-47722	-26507	-15814	-8253	14016	22428	34242	57607	83905
	35	-77830	-52105	-29279	-17774	-9639	11059	17856	27395	46255	67478
	40	-82880	-55676	-31537	-19371	-10769	8971	14618	22535	38183	55790
4	5	3	2104	4828	7413	11038	107882	151364	205708	299369	391648
	10	-12129	-7564	-2941	-271	1909	35854	50575	68940	100558	131692
	15	-19507	-13420	-7256	-3696	-871	20325	28932	39657	58112	76279
	20	-24426	-17324	-10132	-5979	-2682	13604	19548	26947	39670	52192
	25	-27926	-20102	-12180	-7604	-3972	9921	14393	19952	29506	38905
	30	-30542	-22178	-13709	-8818	-4936	7632	11178	15581	23143	30580
	35	-32569	-23787	-14895	-9759	-5683	6091	9006	12621	18825	24925
	40	-34186	-25070	-15840	-10509	-6278	4993	7453	10500	15726	20863
5	5	2	1615	3741	5736	8485	70694	94906	123356	169044	211093
	10	-8143	-5257	-2133	-203	1456	23852	31915	41594	57107	71367
	15	-12514	-8932	-5056	-2660	-646	13517	18411	24137	33305	41729
	20	-15273	-11252	-6901	-4212	-1951	9115	12538	16535	22931	28804
	25	-17177	-12853	-8175	-5283	-2851	6693	9297	12334	17187	21642
	30	-18571	-14025	-9107	-6067	-3511	5181	7267	9696	13575	17133
	35	-19636	-14921	-9819	-6666	-4014	4158	5890	7902	11112	14056
	40	-20476	-15627	-10381	-7138	-4411	3426	4900	6610	9336	11835
9	5	1	837	1975	3026	4430	28849	36327	44309	55810	65341
	10	-3470	-2352	-1015	-101	748	9754	12330	15061	18972	22199
	15	-5005	-3759	-2270	-1252	-318	5645	7207	8858	11218	13163
	20	-5898	-4578	-3000	-1921	-932	3851	4967	6143	7822	9205
	25	-6486	-5117	-3481	-2362	-1336	2858	3723	4633	5930	6997
	30	-6903	-5500	-3823	-2675	-1623	2234	2939	3679	4732	5597
	35	-7215	-5786	-4078	-2910	-1838	1808	2403	3025	3909	4636
	40	-7457	-6009	-4276	-3091	-2005	1502	2015	2551	3312	3937

TABLE F($s = 4$) (Continued)

n= 10		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
3	5	1445	4234	8207	12236	18152	237651	365271	545105	901301	1302443
	10	-19443	-10819	-3167	690	3760	78880	121769	182166	301757	436420
	15	-36455	-22849	-10775	-4690	-388	44413	69058	103746	172417	249736
	20	-49463	-32047	-16593	-8804	-3296	29492	46213	69734	116287	168698
	25	-59512	-39152	-21087	-11982	-5543	21340	33703	51085	85478	124195
	30	-67443	-44760	-24633	-14490	-7317	16293	25939	39492	66301	96477
	35	-73836	-49281	-27492	-16511	-8746	12910	20720	31685	53369	77774
	40	-79088	-52994	-29841	-18172	-9921	10513	17011	26127	44149	64430
4	5	987	2978	5818	8627	12626	120687	169239	229919	334501	437541
	10	-10542	-6305	-2013	465	2594	40501	57041	77679	113212	148203
	15	-17841	-12098	-6282	-2923	-257	23125	32833	44935	65760	86263
	20	-22822	-16051	-9194	-5235	-2092	15586	22289	30661	45061	59233
	25	-26423	-18909	-11300	-6906	-3418	11407	16474	22777	33612	44273
	30	-29143	-21068	-12891	-8169	-4420	8811	12835	17835	26424	34874
	35	-31269	-22755	-14134	-9155	-5203	7057	10369	14479	21535	28475
	40	-32975	-24109	-15132	-9947	-5832	5805	8602	12069	18019	23869
5	5	749	2299	4517	6682	9709	79048	106057	137794	188762	235670
	10	-7159	-4429	-1475	351	1983	26681	35941	46793	64186	80175
	15	-11554	-8124	-4414	-2120	-192	15346	20847	27285	37596	47070
	20	-14385	-10505	-6307	-3713	-1531	10402	14256	18759	25966	32586
	25	-16365	-12170	-7631	-4826	-2467	7671	10607	14032	19510	24539
	30	-17829	-13401	-8610	-5649	-3159	5961	8315	11057	15439	19461
	35	-18954	-14348	-9363	-6282	-3692	4800	6755	9029	12659	15989
	40	-19848	-15099	-9960	-6785	-4114	3968	5632	7566	10651	13479
10	5	340	1077	2143	3159	4534	28004	34994	42375	52879	61481
	10	-2712	-1770	-631	157	914	9548	11962	14492	18069	20984
	15	-4068	-3025	-1764	-892	-85	5563	7032	8567	10733	12496
	20	-4861	-3760	-2428	-1507	-654	3817	4869	5965	7511	8768
	25	-5386	-4245	-2867	-1913	-1030	2846	3664	4514	5711	6684
	30	-5760	-4592	-3179	-2202	-1298	2234	2902	3595	4569	5360
	35	-6040	-4851	-3414	-2419	-1499	1815	2379	2963	3783	4448
	40	-6258	-5053	-3596	-2588	-1655	1513	2001	2505	3212	3784

TABLE F($s = 4$) (Continued)

n= 12		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
3	5	3677	6422	10870	15603	22674	288491	443126	661028	1092629	1578691
	10	-13962	-6943	-716	2492	5649	97470	150171	224392	371363	536861
	15	-29441	-17889	-7638	-2472	1187	55651	86239	129302	214561	310559
	20	-41910	-26706	-13215	-6415	-1607	37374	58283	87706	145948	211522
	25	-51893	-33765	-17679	-9572	-3840	27298	42847	64718	108001	156729
	30	-59977	-39481	-21295	-12129	-5647	21010	33196	50327	84223	122381
	35	-66623	-44181	-24267	-14230	-7133	16765	26666	40579	68099	99076
	40	-72168	-48101	-26746	-15984	-8373	13739	22000	33601	56545	82368
4	5	2581	4567	7737	11024	15785	146323	205022	278387	404831	529411
	10	-7907	-4212	-472	1718	3912	49850	70049	95255	138659	181403
	15	-14963	-9813	-4598	-1587	806	28794	40728	55609	81222	106440
	20	-19980	-13795	-7533	-3916	-1045	19564	27866	38211	56010	73530
	25	-23710	-16756	-9714	-5647	-2419	14449	20728	28545	41987	55217
	30	-26585	-19038	-11395	-6981	-3478	11237	16236	22454	33142	43658
	35	-28866	-20848	-12729	-8040	-4318	9055	13177	18299	27100	35758
	40	-30719	-22319	-13813	-8900	-5001	7489	10976	15305	22739	30051
5	5	1990	3550	6022	8549	12145	95771	128379	166696	228233	284869
	10	-5480	-3017	-352	1312	2998	32771	44038	57244	78414	97876
	15	-9860	-6700	-3281	-1168	610	19045	25770	33644	46257	57850
	20	-12784	-9159	-5236	-2812	-774	13018	17744	23271	32120	40250
	25	-14878	-10920	-6637	-3990	-1764	9669	13277	17491	24234	30427
	30	-16453	-12244	-7690	-4876	-2509	7560	10457	13838	19243	24206
	35	-17681	-13277	-8511	-5566	-3089	6122	8530	11337	15823	19939
	40	-18665	-14104	-9169	-6119	-3555	5086	7139	9529	13345	16846
10	5	929	1686	2873	4054	5678	33881	42295	51180	63824	74178
	10	-2143	-1243	-155	602	1389	11683	14598	17654	21975	25498
	15	-3565	-2560	-1344	-503	276	6865	8640	10497	13119	15254
	20	-4419	-3350	-2058	-1164	-337	4742	6014	7343	9216	10741
	25	-4994	-3883	-2539	-1609	-749	3557	4546	5577	7029	8209
	30	-5409	-4267	-2886	-1930	-1046	2806	3614	4454	5636	6597
	35	-5723	-4557	-3148	-2173	-1271	2291	2973	3681	4677	5485
	40	-5969	-4785	-3354	-2364	-1447	1919	2508	3119	3977	4673
12	5	766	1394	2377	3352	4685	26808	33129	39698	48881	56271
	10	-1722	-1006	-127	495	1144	9255	11444	13698	16826	19328
	15	-2834	-2050	-1087	-410	226	5447	6785	8159	10062	11583
	20	-3491	-2667	-1655	-943	-275	3769	4731	5717	7081	8170
	25	-3929	-3079	-2033	-1299	-609	2831	3581	4349	5409	6254
	30	-4244	-3374	-2305	-1554	-848	2237	2851	3478	4344	5033
	35	-4481	-3596	-2510	-1746	-1029	1829	2349	2879	3609	4190
	40	-4666	-3770	-2670	-1896	-1169	1533	1983	2442	3073	3575

TABLE F($s = 4$) (Continued)

n= 15		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
3	5	6392	9427	14743	20583	29417	364813	560008	835065	1379876	1993435
	10	-8221	-2884	1869	4794	8391	125544	193058	288149	476453	688497
	15	-21562	-12318	-4115	19	3144	72773	112402	168203	278690	403101
	20	-33019	-20419	-9239	-3604	381	49496	76824	115291	191446	277194
	25	-42615	-27205	-13530	-6638	-1765	36542	57007	85804	142806	206984
	30	-50652	-32887	-17124	-9180	-3562	28387	44516	67203	112103	162652
	35	-57432	-37682	-20157	-11324	-5078	22838	36003	54514	91143	132378
	40	-63207	-41765	-22739	-13150	-6370	18853	29879	45376	76036	110549
4	5	4564	6760	10532	14571	20499	184813	258748	351157	510425	687345
	10	-4918	-1841	1283	3346	5825	63964	89680	121778	177053	231489
	15	-11517	-7078	-2583	13	2165	37415	52723	71819	104693	137063
	20	-16451	-10994	-5469	-2277	255	25689	36399	49751	72730	95353
	25	-20251	-14010	-7691	-4041	-1145	19142	27276	37411	54847	72010
	30	-23258	-16397	-9449	-5437	-2252	15003	21501	29591	43505	57199
	35	-25693	-18329	-10873	-6567	-3149	12173	17545	24229	35721	47029
	40	-27702	-19924	-12048	-7500	-3890	10130	14685	20347	30079	39653
5	5	3555	5282	8217	11314	15782	120879	161894	210091	287494	358732
	10	-3499	-1351	977	2574	4472	41962	56254	73008	99870	124567
	15	-7766	-4939	-1881	10	1654	24665	33242	43288	59388	74187
	20	-10741	-7441	-3870	-1664	192	17018	23069	30151	41495	51919
	25	-12938	-9288	-5340	-2899	-847	12742	17375	22792	31465	39432
	30	-14628	-10709	-6469	-3849	-1646	10032	13761	18117	25088	31490
	35	-15968	-11836	-7366	-4603	-2279	8175	11280	14904	20700	26022
	40	-17057	-12752	-8094	-5215	-2794	6831	9481	12571	17510	22044
10	5	1694	2536	3940	5379	7388	42706	53257	64398	80254	93238
	10	-1426	-579	446	1200	2080	14903	18571	22418	27860	32296
	15	-2910	-1953	-796	4	759	8837	11075	13418	16728	19424
	20	-3830	-2805	-1565	-708	86	6151	7757	9435	11803	13731
	25	-4463	-3391	-2094	-1198	-368	4644	5893	7196	9033	10528
	30	-4927	-3820	-2483	-1557	-701	3685	4705	5768	7265	8483
	35	-5282	-4150	-2780	-1833	-956	3025	3886	4782	6043	7068
	40	-5564	-4410	-3015	-2051	-1157	2545	3290	4063	5151	6034
15	5	1113	1671	2595	3535	4832	25690	31410	37262	45302	51664
	10	-895	-369	289	783	1357	8979	10961	12968	15702	17850
	15	-1784	-1215	-505	3	493	5339	6555	7784	9454	10765
	20	-2318	-1723	-980	-449	55	3726	4603	5488	6690	7632
	25	-2677	-2065	-1300	-754	-235	2820	3506	4197	5134	5868
	30	-2937	-2312	-1532	-975	-445	2243	2806	3372	4139	4740
	35	-3134	-2500	-1708	-1142	-604	1846	2323	2802	3451	3958
	40	-3289	-2648	-1846	-1274	-729	1556	1971	2386	2947	3386

TABLE F(s = 4) (Continued)

n= 20		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
3	5	10375	14142	21046	28786	40597	492098	754940	1125325	1858955	2685158
	10	-2380	1249	5016	8288	12846	172586	264920	394979	652536	942569
	15	-12834	-6146	-212	2896	6106	101695	156579	233873	386926	559272
	20	-22562	-13025	-4562	-297	2871	70163	108404	162249	268862	388908
	25	-31207	-19138	-8428	-3031	787	52450	81336	121999	202501	293145
	30	-38785	-24496	-11817	-5427	-909	41195	64125	96395	160276	232201
	35	-45412	-29182	-14781	-7523	-2390	33468	52298	78793	131233	190275
	40	-51223	-33291	-17380	-9361	-3690	27872	43725	66024	110155	159838
4	5	7494	10208	15085	20418	28318	249009	348359	472533	686547	897407
	10	-1529	850	3526	5828	8935	87611	122569	166208	241363	315380
	15	-7340	-3763	-141	2003	4231	51957	72947	99139	144238	188648
	20	-11969	-7437	-2847	-197	1975	36098	50883	69327	101075	132337
	25	-15703	-10400	-5031	-1930	531	27177	38468	52547	76776	100631
	30	-18764	-12830	-6822	-3351	-597	21496	30555	41846	61273	80398
	35	-21314	-14854	-8312	-4535	-1536	17584	25101	34466	50575	66431
	40	-23467	-16562	-9571	-5534	-2329	14741	21134	29093	42781	56253
5	5	5880	8010	11795	15874	21815	162758	217795	282470	386336	481929
	10	-1126	644	2723	4506	6871	57359	76714	99407	135797	169255
	15	-5111	-2707	-105	1532	3245	34136	45827	59528	81488	101675
	20	-8045	-5174	-2067	-147	1507	23805	32094	41801	57356	71653
	25	-10300	-7070	-3575	-1415	401	17989	24359	31815	43758	54733
	30	-12087	-8573	-4771	-2421	-444	14280	19422	25438	35070	43920
	35	-13540	-9794	-5742	-3237	-1131	11722	16014	21032	29064	36442
	40	-14743	-10807	-6547	-3914	-1700	9860	13531	17819	24680	30981
10	5	2845	3881	5681	7568	10226	57426	71539	86444	107655	125024
	10	-486	292	1277	2122	3207	20294	25221	30390	37705	43668
	15	-2014	-1123	-47	705	1505	12156	15169	18326	22788	26423
	20	-3000	-2036	-871	-65	691	8535	10699	12964	16163	18768
	25	-3698	-2683	-1455	-606	180	6492	8177	9938	12424	14447
	30	-4222	-3168	-1893	-1011	-195	5187	6563	8001	10029	11679
	35	-4630	-3546	-2234	-1327	-488	4284	5446	6658	8368	9758
	40	-4958	-3849	-2509	-1581	-723	3624	4629	5676	7151	8351
15	5	1879	2565	3749	4978	6691	34530	42173	49992	60735	69237
	10	-310	188	835	1389	2095	12212	14866	17556	21220	24099
	15	-1252	-708	-30	458	981	7330	8960	10609	12851	14611
	20	-1837	-1265	-552	-42	449	5157	6333	7521	9136	10402
	25	-2242	-1651	-913	-385	116	3931	4850	5778	7038	8025
	30	-2541	-1935	-1179	-639	-125	3146	3901	4661	5693	6501
	35	-2771	-2154	-1384	-834	-311	2603	3243	3887	4759	5443
	40	-2954	-2329	-1548	-990	-459	2207	2761	3319	4075	4666
20	5	1403	1916	2799	3711	4975	24644	29822	35039	42088	47577
	10	-227	139	620	1033	1557	8719	10511	12296	14682	16524
	15	-908	-517	-22	340	727	5239	6341	7438	8900	10028
	20	-1323	-918	-404	-31	332	3689	4487	5279	6334	7147
	25	-1607	-1192	-665	-283	86	2815	3440	4060	4885	5520
	30	-1815	-1392	-856	-467	-92	2255	2769	3278	3955	4476
	35	-1975	-1546	-1002	-608	-228	1868	2304	2736	3310	3751
	40	-2101	-1668	-1118	-720	-336	1584	1964	2339	2836	3219

TABLE F($s = 4$) (Continued)

n= 25		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
3	5	14113	18705	27262	36933	51740	619427	949948	1415701	2338229	3377166
	10	1045	3876	7757	11618	17227	219775	337011	502152	829186	1197458
	15	-7284	-2221	2311	5246	8947	130859	201119	300077	496034	716695
	20	-15502	-8033	-1405	1965	5061	91139	140444	209877	347361	502173
	25	-23145	-13437	-4823	-481	2716	68712	106184	158945	263409	381036
	30	-30088	-18347	-7928	-2677	1040	54382	84286	126384	209730	303575
	35	-36341	-22768	-10724	-4654	-362	44488	69161	103887	172631	250033
	40	-41959	-26740	-13237	-6431	-1618	37284	58140	87487	145580	210985
4	5	10249	13549	19578	26228	36113	313233	438010	593963	862751	1127576
	10	709	2720	5499	8199	11999	111335	155564	210780	305876	399533
	15	-4402	-1431	1594	3667	6214	66614	93325	126663	184069	240602
	20	-8666	-4815	-916	1348	3502	46646	65553	89143	129758	169752
	25	-12230	-7644	-3000	-318	1867	35367	49863	67945	99072	129719
	30	-15235	-10029	-4758	-1713	705	28150	39821	54374	79421	104081
	35	-17796	-12061	-6255	-2902	-240	23159	32872	44979	65811	86320
	40	-19999	-13810	-7543	-3924	-1052	19517	27797	38113	55863	73334
5	5	8070	10655	15327	20406	27831	204656	273722	354882	485223	605182
	10	536	2097	4270	6353	9234	72806	97238	125889	171832	214077
	15	-3147	-1055	1218	2824	4773	43678	58503	75879	103734	129342
	20	-5969	-3429	-679	1026	2683	30676	41223	53581	73386	91591
	25	-8206	-5309	-2175	-238	1424	23328	31457	40977	56231	70252
	30	-10022	-6836	-3390	-1259	533	18623	25202	32902	45237	56572
	35	-11527	-8102	-4396	-2106	-179	15366	20868	27305	37613	47085
	40	-12794	-9168	-5244	-2818	-779	12987	17699	23210	32033	40138
10	5	3934	5187	7401	9743	13057	72152	89830	108499	135067	156823
	10	242	980	2025	3007	4319	25701	31890	38384	47574	55068
	15	-1293	-456	558	1319	2222	15497	19288	23262	28879	33457
	20	-2313	-1400	-296	468	1241	10943	13669	16524	20559	23845
	25	-3051	-2084	-914	-105	652	8367	10491	12713	15852	18407
	30	-3615	-2605	-1385	-541	240	6715	8451	10267	12830	14916
	35	-4060	-3018	-1758	-886	-79	5569	7036	8568	10730	12489
	40	-4422	-3353	-2061	-1167	-339	4730	5999	7322	9189	10707
15	5	2606	3434	4889	6413	8547	43373	52940	62727	76174	86816
	10	156	639	1329	1973	2824	15454	18782	22155	26750	30362
	15	-813	-291	362	861	1450	9334	11379	13448	16264	18475
	20	-1431	-879	-190	303	808	6602	8078	9571	11600	13192
	25	-1867	-1294	-578	-67	423	5056	6211	7377	8960	10203
	30	-2194	-1605	-870	-345	155	4065	5012	5968	7265	8282
	35	-2449	-1848	-1097	-561	-51	3376	4179	4988	6086	6947
	40	-2654	-2043	-1280	-735	-217	2872	3568	4270	5221	5966
20	5	1948	2568	3651	4782	6355	30952	37430	43958	52778	59646
	10	115	474	989	1468	2098	11029	13274	15511	18501	20809
	15	-593	-213	268	639	1077	6667	8048	9422	11257	12671
	20	-1036	-640	-139	224	599	4720	5719	6712	8036	9056
	25	-1344	-938	-423	-50	313	3618	4400	5177	6213	7010
	30	-1574	-1159	-634	-253	115	2910	3554	4192	5042	5696
	35	-1752	-1331	-797	-410	-38	2420	2966	3507	4227	4781
	40	-1894	-1468	-928	-537	-159	2060	2534	3004	3629	4109

TABLE F($s = 4$) (Continued)

n= 25		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
25	5	1556	2051	2914	3812	5058	24048	28925	33797	40315	45344
	10	91	377	788	1169	1670	8570	10255	11917	14115	15794
	15	-467	-169	213	508	856	5182	6221	7243	8592	9621
	20	-811	-504	-110	178	476	3671	4423	5162	6137	6879
	25	-1050	-736	-333	-39	249	2815	3405	3984	4747	5328
	30	-1227	-907	-499	-200	91	2266	2751	3227	3854	4331
	35	-1363	-1040	-626	-324	-30	1884	2297	2701	3233	3638
	40	-1472	-1145	-728	-422	-126	1605	1964	2315	2777	3128

TABLE F($s = 4$) (Continued)

n= 30		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
3	5	17749	23200	33437	45052	62863	746779	1144991	1706133	2817598	4069314
	10	3329	6045	10350	14872	21568	267035	409214	609493	1006116	1452752
	15	-3536	429	4291	7436	11733	160144	245845	366555	605593	874768
	20	-10512	-4504	827	3791	7161	112281	172731	257866	426449	616282
	25	-17236	-9259	-2180	1395	4457	85172	131325	196317	325006	469913
	30	-23526	-13707	-4993	-602	2616	67789	104772	156843	259941	376030
	35	-29329	-17809	-7588	-2437	1213	55744	86367	129477	214827	310929
	40	-34648	-21571	-9967	-4119	16	46940	72909	109462	181825	263302
4	5	12931	16841	24042	32017	43896	377471	527681	715422	1038994	1357797
	10	2330	4295	7371	10518	15036	135098	188613	255425	370495	483824
	15	-2237	288	3006	5223	8159	81330	113786	154296	224055	292755
	20	-6144	-2813	559	2636	4967	57272	80326	109096	158632	207413
	25	-9503	-5479	-1405	950	3081	43645	61376	83497	121582	159083
	30	-12400	-7779	-3100	-397	1798	34901	49214	67067	97798	128057
	35	-14916	-9776	-4571	-1565	824	28836	40775	55663	81286	106513
	40	-17115	-11521	-5857	-2585	11	24397	34595	47308	69185	90723
5	5	10202	13262	18836	24922	33838	246564	329662	427312	584133	728463
	10	1793	3337	5739	8162	11579	88278	117796	152413	207924	258968
	15	-1635	217	2316	4035	6273	53259	71227	92291	126061	157108
	20	-4322	-2043	422	2023	3812	37594	50413	65435	89514	111649
	25	-6503	-3878	-1037	721	2358	28720	38622	50222	68813	85901
	30	-8310	-5397	-2245	-297	1371	23024	31052	40454	55517	69362
	35	-9831	-6676	-3262	-1152	624	19071	25796	33668	46280	57869
	40	-11130	-7768	-4131	-1882	8	16174	21943	28693	39503	49437
10	5	4996	6475	9111	11912	15884	86882	108126	130559	162485	188627
	10	834	1583	2739	3875	5423	31116	38569	46390	57458	66482
	15	-696	97	1082	1897	2927	18850	23421	28213	34990	40512
	20	-1731	-861	190	938	1771	13365	16656	20103	24976	28945
	25	-2494	-1568	-448	327	1089	10257	12822	15508	19302	22392
	30	-3084	-2114	-942	-131	628	8260	10358	12554	15654	18179
	35	-3557	-2552	-1337	-497	282	6872	8645	10499	13116	15246
	40	-3944	-2911	-1661	-797	4	5854	7387	8989	11250	13090
15	5	3314	4292	6022	7844	10399	52219	63709	75465	91617	104399
	10	544	1038	1801	2545	3547	18701	22703	26761	32288	36632
	15	-442	62	706	1241	1912	11344	13805	16297	19687	22348
	20	-1081	-546	122	611	1155	8055	9832	11630	14074	15993
	25	-1539	-982	-286	211	709	6190	7580	8985	10895	12392
	30	-1887	-1312	-596	-84	407	4992	6133	7285	8849	10077
	35	-2161	-1573	-840	-316	182	4159	5126	6101	7425	8464
	40	-2383	-1785	-1038	-505	2	3547	4386	5231	6379	7278
20	5	2480	3211	4499	5849	7733	37261	45040	52879	63471	71718
	10	403	773	1342	1895	2637	13343	16041	18730	22324	25099
	15	-324	46	524	923	1420	8099	9760	11413	13619	15320
	20	-786	-399	90	453	857	5755	6957	8151	9744	10972
	25	-1112	-714	-210	156	525	4426	5367	6302	7548	8508
	30	-1358	-951	-436	-62	301	3572	4345	5113	6136	6924
	35	-1551	-1137	-612	-232	134	2978	3634	4285	5152	5820
	40	-1706	-1286	-755	-370	2	2541	3112	3677	4429	5008

TABLE F($\delta = 4$) (Continued)

n= 30		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
25	5	1982	2565	3592	4664	6156	28949	34804	40654	48480	54517
	10	320	615	1070	1510	2099	10366	12391	14388	17030	19047
	15	-256	36	417	734	1130	6295	7542	8771	10393	11629
	20	-617	-315	72	360	681	4475	5378	6267	7439	8332
	25	-871	-561	-166	124	417	3443	4151	4847	5765	6464
	30	-1061	-746	-343	-49	239	2779	3362	3935	4688	5263
	35	-1209	-890	-482	-183	107	2318	2813	3299	3939	4425
	40	-1328	-1005	-593	-292	1	1979	2410	2832	3387	3809
30	5	1650	2136	2989	3879	5113	23663	28350	33005	39193	43938
	10	266	511	889	1255	1743	8473	10090	11675	13755	15332
	15	-211	30	346	610	938	5147	6144	7119	8396	9363
	20	-508	-260	59	298	565	3660	4382	5088	6011	6710
	25	-715	-462	-137	103	346	2816	3383	3937	4660	5208
	30	-870	-613	-283	-40	198	2274	2741	3196	3791	4241
	35	-990	-731	-397	-152	88	1897	2294	2681	3186	3567
	40	-1087	-825	-488	-241	1	1620	1965	2301	2740	3071

TABLE F($s = 4$) (Continued)

n= 35		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
3	5	21332	27659	39589	53154	73976	874142	1340055	1996596	3297021	4761541
	10	5185	8036	12868	18082	25884	314335	481479	716928	1183203	1708275
	15	-888	2333	6074	9550	14486	189497	290677	433192	715412	1033216
	20	-6856	-1919	2517	5463	9217	133518	205163	306069	505886	730893
	25	-12778	-6106	-187	2916	6128	101750	156644	233949	387025	559396
	30	-18453	-10119	-2724	1004	4063	81333	125460	187596	310629	449167
	35	-23795	-13897	-5114	-687	2547	67150	103794	155388	257540	372564
	40	-28779	-17421	-7342	-2263	1339	56756	87912	131775	218614	316394
4	5	15574	20106	28490	37796	51672	441717	617363	836896	1215261	1588048
	10	3681	5749	9190	12808	18058	158883	221694	300113	435174	568195
	15	-583	1613	4287	6727	10083	96082	134295	181993	264134	345029
	20	-4163	-1241	1741	3821	6402	67943	95161	129131	187623	245226
	25	-7312	-3740	-124	2017	4247	51978	72962	99145	144227	188621
	30	-10079	-5937	-1742	681	2806	41714	58689	79866	116324	152223
	35	-12520	-7874	-3170	-453	1749	34579	48765	66459	96917	126907
	40	-14683	-9591	-4435	-1457	911	29346	41484	56620	82671	108320
5	5	12304	15847	22332	29430	39840	288478	385609	499751	683057	851760
	10	2858	4485	7168	9948	13912	103765	138374	178962	244051	303901
	15	-434	1233	3319	5206	7757	62862	83981	108741	148438	184935
	20	-2983	-917	1331	2944	4918	44541	59639	77335	105702	131780
	25	-5092	-2691	-93	1543	3257	34146	45830	59520	81463	101633
	30	-6868	-4184	-1280	515	2147	27462	36950	48063	65872	82242
	35	-8383	-5459	-2294	-338	1333	22814	30772	40092	55024	68747
	40	-9692	-6559	-3169	-1074	690	19403	26237	34238	47054	58832
10	5	6043	7753	10815	14077	18709	101614	126423	152621	189908	220436
	10	1352	2146	3434	4733	6522	36537	45254	54402	67349	77907
	15	-191	566	1565	2457	3625	22210	27563	33175	41111	47579
	20	-1230	-398	612	1376	2290	15797	19653	23694	29406	34060
	25	-2007	-1117	-41	711	1510	12158	15166	18316	22767	26393
	30	-2616	-1681	-550	232	990	9816	12278	14854	18494	21459
	35	-3108	-2136	-961	-149	610	8186	10267	12444	15518	18021
	40	-3514	-2513	-1301	-464	312	6989	8789	10671	13328	15491
15	5	4013	5142	7151	9272	12251	61065	74480	88205	107061	121983
	10	886	1412	2262	3111	4268	21951	26628	31370	37830	42907
	15	-122	368	1025	1611	2369	13358	16236	19150	23115	26229
	20	-774	-254	397	898	1495	9513	11592	13695	16556	18802
	25	-1248	-705	-26	462	984	7330	8957	10601	12836	14590
	30	-1611	-1050	-350	150	644	5926	7260	8609	10442	11879
	35	-1900	-1325	-608	-95	396	4948	6079	7221	8773	9989
	40	-2136	-1550	-818	-296	202	4229	5210	6200	7545	8599
20	5	3005	3849	5344	6915	9111	43571	52651	61801	74164	83791
	10	659	1053	1687	2318	3173	15660	18811	21951	26150	29392
	15	-90	272	762	1198	1760	9535	11476	13407	15986	17974
	20	-565	-186	294	667	1110	6794	8198	9594	11457	12893
	25	-905	-515	-19	342	730	5239	6339	7431	8889	10012
	30	-1164	-764	-257	111	477	4237	5141	6039	7235	8157
	35	-1368	-960	-444	-70	293	3540	4307	5069	6083	6864
	40	-1533	-1120	-597	-217	149	3028	3694	4355	5235	5912

TABLE F($s = 4$) (Continued)

n= 35		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
25	5	2402	3076	4267	5515	7253	33850	40684	47511	56645	63691
	10	525	839	1345	1847	2526	12164	14528	16861	19946	22302
	15	-71	216	606	954	1400	7409	8868	10301	12196	13641
	20	-445	-147	234	531	883	5261	6336	7375	8744	9788
	25	-710	-405	-15	272	580	4074	4901	5714	6787	7604
	30	-910	-600	-203	88	379	3296	3977	4645	5527	6198
	35	-1068	-753	-350	-56	232	2755	3333	3900	4648	5217
	40	-1196	-877	-469	-171	118	2357	2859	3352	4001	4495
30	5	2001	2561	3551	4586	6025	27669	33138	38571	45793	51330
	10	436	697	1118	1535	2098	9942	11830	13680	16109	17951
	15	-59	179	504	793	1163	6057	7221	8360	9852	10981
	20	-367	-122	194	440	733	4319	5162	5986	7065	7882
	25	-584	-334	-13	225	482	3332	3994	4640	5485	6125
	30	-748	-494	-168	73	314	2697	3241	3773	4468	4993
	35	-876	-619	-289	-46	193	2254	2717	3168	3758	4204
	40	-980	-720	-387	-142	98	1929	2331	2724	3236	3623
35	5	1714	2194	3041	3925	5152	23394	27949	32455	38419	42971
	10	373	597	957	1314	1794	8406	9975	11506	13505	15014
	15	-50	153	431	678	994	5122	6090	7032	8260	9185
	20	-312	-104	165	376	626	3653	4354	5036	5925	6594
	25	-496	-284	-11	192	412	2818	3369	3904	4601	5125
	30	-634	-420	-143	62	269	2282	2735	3175	3748	4179
	35	-743	-526	-246	-39	165	1908	2293	2667	3154	3519
	40	-830	-611	-329	-121	84	1632	1968	2293	2716	3034

TABLE F($s = 4$) (Continued)

n= 40		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
3	5	24885	32096	45727	61246	85083	1001512	1535131	2287078	3776477	5453816
	10	6857	9936	15341	21265	30184	361657	553781	824420	1360387	1963940
	15	1054	3883	7762	11618	17217	218893	335573	499926	825393	1191899
	20	-4097	32	3964	7059	11246	154814	237686	354408	585546	845825
	25	-9331	-3669	1360	4290	7763	118405	182076	271750	449319	649272
	30	-14450	-7288	-934	2322	5453	94967	146281	218545	361635	522759
	35	-19353	-10755	-3127	718	3785	78656	121369	181515	300604	434701
	40	-23995	-14038	-5203	-750	2495	66681	103076	154320	255760	370023
4	5	18195	23355	32928	43568	59443	505968	707053	958380	1391543	1818319
	10	4909	7138	10978	15080	21070	182682	254794	344827	499893	652617
	15	715	2726	5503	8200	11993	110856	154835	209732	304273	397380
	20	-2572	21	2772	4955	7819	78644	110038	149220	216691	283137
	25	-5518	-2317	927	2989	5388	60346	84596	114858	166964	218275
	30	-8149	-4405	-613	1599	3776	48567	68218	92737	134951	176519
	35	-10500	-6271	-1989	485	2612	40367	56815	77334	112658	147440
	40	-12609	-7945	-3222	-494	1713	34343	48436	66014	96272	126064
5	5	14388	18420	25821	33933	45839	330395	441562	572196	781989	975068
	10	3830	5585	8574	11721	16238	119261	158964	205527	280199	348861
	15	541	2102	4273	6355	9231	72479	96754	125215	170847	212801
	20	-1873	16	2133	3827	6011	51507	68890	89266	121930	151960
	25	-3904	-1691	703	2297	4136	39595	53066	68854	94159	117422
	30	-5636	-3149	-457	1220	2894	31925	42878	55711	76279	95184
	35	-7133	-4407	-1457	366	1997	26585	35783	46557	63822	79692
	40	-8438	-5504	-2330	-368	1306	22660	30567	39826	54662	68297
10	5	7081	9025	12516	16240	21533	116348	144722	174686	217329	252247
	10	1831	2688	4119	5585	7618	41960	51943	62419	77246	89336
	15	244	982	2027	3008	4318	25575	31710	38142	47240	54655
	20	-793	7	994	1797	2804	18234	22657	27292	33845	39185
	25	-1577	-719	319	1068	1923	14065	17517	21132	26243	30406
	30	-2198	-1294	-200	559	1340	11379	14206	17165	21346	24751
	35	-2703	-1762	-623	164	920	9508	11898	14399	17931	20808
	40	-3125	-2152	-976	-162	597	8132	10200	12363	15418	17905
15	5	4706	5989	8278	10699	14101	69913	85252	100945	122506	139568
	10	1204	1772	2716	3673	4987	25203	30555	35982	43375	49185
	15	158	641	1330	1974	2824	15376	18671	22007	26547	30113
	20	-503	5	648	1176	1831	10974	13355	15765	19042	21615
	25	-987	-457	206	696	1254	8474	10337	12221	14783	16794
	30	-1362	-813	-128	362	873	6864	8393	9938	12039	13688
	35	-1663	-1100	-396	106	598	5741	7037	8347	10126	11521
	40	-1910	-1335	-617	-104	387	4915	6039	7175	8717	9926
20	5	3525	4484	6187	7980	10487	49882	60263	70724	84858	95865
	10	897	1322	2026	2737	3708	17977	21582	25174	29978	33687
	15	116	476	990	1469	2098	10973	13193	15404	18355	20631
	20	-368	3	481	874	1360	7836	9443	11041	13173	14817
	25	-718	-334	152	516	931	6054	7313	8564	10233	11519
	30	-987	-593	-94	268	647	4906	5941	6968	8339	9394
	35	-1200	-799	-291	78	443	4106	4984	5856	7017	7912
	40	-1375	-967	-451	-78	287	3517	4279	5036	6044	6820

TABLE F($s = 4$) (Continued)

n= 40		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
25	5	2819	3584	4940	6364	8349	38751	46564	54369	64811	72868
	10	715	1055	1616	2182	2952	13964	16667	19335	22863	25558
	15	92	378	789	1170	1670	8525	10192	11834	14001	15655
	20	-290	3	382	695	1082	6090	7297	8485	10052	11247
	25	-565	-264	121	410	740	4707	5653	6584	7811	8747
	30	-773	-467	-75	213	515	3815	4594	5359	6367	7136
	35	-939	-627	-229	62	352	3194	3855	4505	5360	6012
	40	-1073	-758	-355	-60	227	2737	3311	3875	4618	5184
30	5	2348	2985	4112	5293	6936	31674	37927	44137	52393	58722
	10	594	877	1344	1814	2452	11412	13571	15687	18464	20570
	15	76	314	655	972	1387	6969	8300	9602	11309	12601
	20	-240	2	317	577	898	4979	5944	6886	8121	9055
	25	-465	-218	100	341	614	3849	4606	5345	6312	7044
	30	-636	-385	-62	176	427	3121	3743	4351	5146	5748
	35	-771	-516	-189	51	292	2613	3142	3658	4333	4844
	40	-881	-624	-293	-50	189	2240	2700	3148	3734	4178
35	5	2012	2557	3522	4530	5931	26780	31988	37139	43955	49159
	10	508	751	1151	1552	2096	9648	11443	13193	15479	17204
	15	65	268	561	832	1186	5892	6999	8077	9481	10540
	20	-204	2	271	494	768	4211	5013	5793	6810	7575
	25	-395	-186	85	291	525	3256	3885	4497	5294	5893
	30	-540	-327	-53	151	365	2640	3158	3662	4317	4810
	35	-654	-439	-161	44	249	2211	2651	3079	3635	4054
	40	-746	-529	-249	-43	161	1895	2278	2650	3133	3497
40	5	1760	2237	3079	3960	5181	23195	27654	32052	37853	42267
	10	444	656	1006	1357	1831	8356	9891	11382	13322	14781
	15	57	234	490	727	1035	5104	6050	6969	8161	9056
	20	-178	2	237	431	671	3648	4334	4999	5862	6509
	25	-344	-162	74	254	459	2820	3359	3881	4557	5065
	30	-469	-285	-46	131	319	2287	2731	3160	3717	4134
	35	-568	-382	-141	38	218	1916	2293	2658	3131	3485
	40	-648	-460	-217	-37	141	1642	1971	2288	2699	3006

TABLE F($s = 4$) (Continued)

n= 50		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
3	5	31939	40932	57979	77413	107283	1256267	1925304	2868078	4735448	6838452
	10	9952	13593	20213	27582	38754	456342	698452	1039507	1714926	2475518
	15	3829	6564	10991	15677	22636	277755	425481	633566	1045644	1509681
	20	-280	2795	6557	10135	15252	197513	302895	451328	745269	1076270
	25	-4428	-202	3777	6846	10972	151850	233150	347659	574412	829753
	30	-8616	-3163	1886	4609	8154	122400	188173	280808	464242	670799
	35	-12742	-6081	-170	2929	6143	101859	156804	234183	387403	559937
	40	-16746	-8912	-1961	1554	4622	86740	133715	199864	330844	478332
4	5	23398	29826	41786	55099	74978	634478	886444	1201366	1744132	2278895
	10	7188	9817	14503	19590	27073	230303	321029	434303	629401	821551
	15	2693	4674	7834	11094	15786	140445	195970	265286	384660	502225
	20	-186	1942	4635	7144	10620	100101	139865	189498	274971	359146
	25	-2768	-134-	2638	4804	7628	77152	107956	146404	212609	277807
	30	-5133	-2011	1155	3215	5660	62352	87382	118617	172401	225364
	35	-7294	-3726	-113	2026	4257	52030	73031	99236	144354	188782
	40	-9268	-5293	-1268	1061	3196	44431	62465	84965	123702	161845
5	5	18526	23545	32785	42930	57831	414235	553475	717098	979867	1221703
	10	5639	7705	11346	15242	20876	150270	200167	258687	352534	438830
	15	2078	3636	6104	8612	12159	91740	122335	158207	215724	268607
	20	-139	1489	3592	5531	8171	65474	87437	113184	154464	192415
	25	-2011	-100	2029	3709	5863	50534	67593	87588	119643	149111
	30	-3644	-1473	878	2473	4346	40900	54798	71085	97192	121191
	35	-5080	-2681	-65	1550	3265	34180	45872	59571	81529	101712
	40	-6354	-3752	-937	806	2447	29232	39299	51092	69992	87365
10	5	9143	11558	15910	20561	27177	145816	181323	218818	272179	315873
	10	2728	3735	5471	7278	9805	52814	65329	78462	97050	112208
	15	972	1730	2916	4092	5697	32313	40015	48090	59513	68822
	20	-62	688	1697	2613	3820	23121	28679	34504	42742	49454
	25	-849	-44	944	1741	2734	17893	22234	26783	33214	38453
	30	-1481	-630	400	1151	2022	14521	18078	21804	27070	31360
	35	-2003	-1113	-38	714	1514	12169	15178	18329	22782	26409
	40	-2444	-1521	-406	366	1131	10436	13041	15769	19622	22760
15	5	6082	7676	10528	13549	17801	87609	106797	126428	153398	174741
	10	1802	2469	3612	4790	6420	31710	38414	45210	54469	61747
	15	634	1136	1919	2688	3728	19415	23545	27728	33419	37890
	20	-40	447	1112	1713	2497	13904	16890	19912	24024	27252
	25	-538	-29	615	1139	1786	10769	13107	15471	18687	21211
	30	-928	-400	259	751	1319	8748	10667	12607	15246	17317
	35	-1245	-702	-24	464	987	7337	8964	10608	12844	14598
	40	-1509	-953	-259	237	736	6297	7709	9135	11073	12593
20	5	4559	5749	7871	10108	13240	62503	75487	88571	106248	120013
	10	1345	1845	2697	3572	4775	22615	27127	31624	37638	42281
	15	471	845	1430	2002	2771	13851	16633	19401	23098	25949
	20	-29	331	827	1275	1855	9923	11936	13939	16612	18672
	25	-393	-21	456	846	1326	7690	9267	10835	12928	14540
	30	-676	-294	191	557	979	6249	7545	8834	10552	11876
	35	-903	-513	-18	344	732	5243	6343	7436	8894	10017
	40	-1091	-694	-190	175	546	4502	5458	6407	7671	8645

TABLE F($s = 4$) (Continued)

n= 50		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
25	5	3646	4596	6285	8062	10541	48555	58325	68085	81143	91216
	10	1074	1472	2152	2848	3801	17564	20947	24286	28701	32073
	15	374	673	1140	1595	2205	10760	12846	14902	17616	19686
	20	-23	263	658	1015	1476	7711	9221	10709	12672	14169
	25	-310	-17	363	673	1055	5977	7161	8327	9865	11037
	30	-532	-232	152	443	779	4858	5832	6791	8054	9017
	35	-709	-404	-14	273	582	4077	4905	5718	6790	7607
	40	-854	-545	-150	139	434	3502	4221	4927	5859	6568
30	5	3038	3828	5232	6705	8757	39687	47505	55271	65594	73509
	10	893	1225	1790	2368	3158	14354	17054	19701	23176	25812
	15	311	560	948	1326	1832	8795	10460	12090	14226	15844
	20	-19	218	547	843	1226	6303	7510	8690	10235	11405
	25	-256	-14	301	559	876	4887	5833	6758	7969	8886
	30	-438	-191	126	368	646	3973	4752	5512	6508	7261
	35	-583	-333	-12	226	483	3335	3997	4643	5488	6127
	40	-702	-449	-124	115	360	2865	3440	4001	4736	5291
35	5	2604	3280	4481	5739	7489	33554	40065	46506	55029	61536
	10	765	1049	1533	2026	2700	12134	14379	16569	19428	21586
	15	266	479	811	1135	1566	7436	8820	10168	11926	13250
	20	-16	186	468	721	1048	5330	6333	7310	8582	9539
	25	-218	-12	257	478	749	4132	4920	5686	6683	7433
	30	-372	-163	107	314	552	3360	4008	4638	5458	6075
	35	-495	-283	-10	193	413	2821	3372	3907	4603	5127
	40	-596	-382	-106	98	307	2424	2902	3368	3973	4428
40	5	2278	2870	3919	5017	6542	29061	34637	40135	47388	52907
	10	669	917	1340	1771	2359	10509	12428	14294	16721	18545
	15	232	418	709	991	1368	6440	7624	8773	10264	11384
	20	-14	163	409	630	915	4617	5475	6307	7387	8196
	25	-190	-10	225	418	654	3580	4253	4906	5752	6387
	30	-324	-142	94	274	482	2911	3465	4003	4699	5221
	35	-430	-247	-9	169	360	2444	2915	3372	3963	4406
	40	-517	-332	-92	86	268	2100	2510	2907	3421	3806
45	5	2025	2551	3482	4456	5808	25629	30503	35298	41607	46396
	10	594	815	1190	1573	2094	9267	10943	12567	14674	16253
	15	206	371	630	880	1214	5679	6713	7713	9008	9977
	20	-13	144	363	560	812	4072	4821	5546	6483	7184
	25	-168	-9	199	371	580	3157	3746	4314	5049	5599
	30	-286	-126	83	243	428	2568	3052	3520	4125	4576
	35	-381	-218	-8	150	320	2156	2568	2965	3479	3863
	40	-457	-294	-82	76	238	1853	2211	2557	3003	3337
50	5	1823	2295	3132	4008	5222	22921	27249	31499	37080	41308
	10	534	733	1071	1415	1883	8287	9774	11212	13072	14463
	15	185	334	566	792	1092	5079	5996	6882	8025	8878
	20	-11	130	326	503	730	3642	4307	4948	5776	6393
	25	-151	-8	179	333	522	2824	3346	3850	4499	4983
	30	-257	-113	75	219	385	2297	2727	3141	3675	4073
	35	-341	-196	-7	134	287	1929	2294	2646	3100	3438
	40	-410	-263	-73	68	214	1657	1975	2282	2676	2970

TABLE F($s = 4$) (Continued)

n= 60		α										
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995	
3	5	38955	49741	70213	93567	129473	1511031	2315495	3449104	5694464	8223156	
	10	12885	17150	25027	33862	47299	551057	843173	1254671	2069596	2987286	
	15	6049	9005	14116	19675	28019	336672	515474	767339	1266115	1827783	
	20	2194	4918	8971	13124	19216	240292	368229	548436	905302	1307164	
	25	-1178	2117	5853	9281	14130	185400	284386	423809	699903	1010808	
	30	-4646	-356	3656	6710	10796	149961	230262	343362	567325	819524	
	35	-8137	-2825	1908	4831	8428	125212	192466	287186	474750	685957	
	40	-11590	-5266	345	3363	6650	106970	164609	245782	406516	587511	
4	5	28573	36276	50630	66621	90507	762995	1065846	1444365	2096741	2739497	
	10	9352	12424	17987	24075	33061	277943	387291	523817	758963	990558	
	15	4315	6458	10093	13947	19557	170063	237150	320900	465134	607183	
	20	1515	3476	6376	9274	13393	121601	169752	229857	333366	435305	
	25	-771	1460	4129	6536	9835	94010	131391	178048	258394	337520	
	30	-2897	-236	2552	4707	7505	76201	106632	144612	210013	274418	
	35	-4872	-1804	1310	3373	5852	63765	89344	121265	176230	230357	
	40	-6705	-3258	231	2333	4611	54598	76601	104056	151327	197877	
5	5	22641	28653	39738	51919	69817	498080	685395	862008	1177758	1468352	
	10	7360	9771	14088	18744	25502	181292	241388	311869	424901	528838	
	15	3359	5046	7879	10839	15071	111022	147943	191235	260649	324472	
	20	1157	2691	4958	7192	10312	79469	106021	137150	187059	232946	
	25	-573	1114	3195	5058	7566	61507	82164	106379	145200	180890	
	30	-2102	-177	1962	3633	5769	49914	66768	86522	118189	147301	
	35	-3467	-1325	998	2595	4494	41819	56017	72656	99328	123846	
	40	-4694	-2356	174	1788	3537	35852	48092	62434	85422	106553	
10	5	11193	14083	19299	24879	32820	175287	217927	262953	327033	379503	
	10	3585	4756	6809	8962	11986	63672	78719	94511	116862	135087	
	15	1599	2423	3781	5162	7070	39059	48328	58048	71797	83002	
	20	531	1268	2360	3410	4828	28016	34711	41729	51653	59740	
	25	-251	510	1505	2386	3535	21732	26964	32448	40202	46519	
	30	-885	-78	912	1705	2690	17675	21965	26460	32813	37989	
	35	-1415	-568	456	1210	2091	14843	18474	22277	27653	32032	
	40	-1865	-986	78	826	1642	12754	15899	19193	23847	27638	
15	5	7451	9357	12775	16398	21499	105307	128343	151912	184292	209916	
	10	2373	3149	4499	5902	7851	38221	46275	54442	65568	74314	
	15	1050	1596	2492	3394	4628	23459	28425	33453	40298	45673	
	20	344	830	1550	2239	3158	16838	20430	24066	29013	32897	
	25	-160	331	985	1564	2310	13071	15883	18729	22600	25639	
	30	-560	-50	594	1115	1757	10639	12948	15285	18462	20956	
	35	-888	-362	295	789	1364	8940	10899	12879	15572	17685	
	40	-1162	-623	50	538	1071	7688	9387	11105	13440	15272	
20	5	5587	7010	9551	12234	15991	75126	90712	106419	127639	144163	
	10	1774	2354	3361	4402	5840	27254	32674	38076	45300	50877	
	15	782	1190	1859	2529	3441	16733	20075	23402	27845	31272	
	20	255	617	1155	1667	2347	12015	14434	16842	20055	22532	
	25	-118	245	732	1163	1717	9330	11226	13112	15628	17568	
	30	-410	-37	441	828	1305	7597	9155	10705	12772	14365	
	35	-647	-265	218	586	1013	6386	7709	9024	10777	12128	
	40	-844	-455	37	398	794	5493	6642	7783	9305	10478	

TABLE F($s = 4$) (Continued)

n= 60		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
25	5	4469	5604	7628	9758	12732	58359	70087	81802	97476	109568
	10	1417	1880	2682	3510	4649	21166	25229	29238	34540	38591
	15	623	949	1483	2016	2739	12997	15503	17972	21233	23720
	20	202	491	920	1328	1868	9334	11149	12937	15296	17095
	25	-93	194	583	926	1366	7250	8673	10074	11922	13331
	30	-323	-29	350	659	1038	5904	7075	8227	9746	10904
	35	-509	-209	173	466	805	4965	5959	6936	8226	9208
	40	-662	-359	29	316	631	4271	5135	5984	7104	7957
30	5	3724	4669	6350	8116	10577	47699	57084	66405	78795	88296
	10	1179	1565	2232	2919	3862	17296	20539	23718	27890	31055
	15	517	789	1233	1676	2275	10622	12622	14580	17145	19089
	20	168	407	765	1104	1551	7630	9079	10496	12353	13758
	25	-77	161	484	769	1134	5927	7064	8175	9630	10731
	30	-267	-24	291	547	862	4828	5763	6677	7873	8779
	35	-419	-173	144	387	669	4060	4854	5631	6646	7415
	40	-545	-296	24	262	524	3494	4184	4859	5741	6408
35	5	3193	4001	5439	6948	9046	40328	48143	55873	66104	73914
	10	1010	1341	1911	2498	3303	14621	17316	19946	23379	25970
	15	443	675	1055	1434	1945	8980	10643	12262	14372	15963
	20	143	348	654	944	1326	6451	7656	8828	10356	11507
	25	-66	138	414	658	970	5012	5957	6877	8074	8976
	30	-227	-21	248	468	736	4083	4861	5617	6602	7344
	35	-356	-147	123	330	571	3434	4095	4737	5574	6203
	40	-463	-252	21	224	448	2955	3530	4088	4815	5362
40	5	2794	3500	4756	6073	7902	34928	41620	48219	56924	63548
	10	883	1172	1671	2184	2886	12662	14966	17206	20120	22310
	15	387	590	922	1253	1699	7777	9199	10578	12369	13714
	20	125	304	572	825	1158	5587	6618	7617	8913	9886
	25	-57	120	362	575	847	4341	5150	5933	6950	7712
	30	-198	-18	217	409	643	3537	4202	4847	5683	6310
	35	-310	-128	107	288	499	2975	3540	4088	4798	5331
	40	-403	-219	18	196	391	2560	3052	3528	4146	4608
45	5	2483	3111	4226	5394	7016	30802	36652	42407	49979	55726
	10	785	1042	1485	1939	2562	11165	13177	15127	17656	19552
	15	343	524	819	1113	1508	6858	8100	9300	10855	12018
	20	111	270	508	732	1028	4927	5827	6697	7822	8664
	25	-51	106	321	510	752	3829	4535	5217	6100	6760
	30	-175	-16	192	363	571	3119	3701	4262	4988	5531
	35	-274	-114	95	256	443	2624	3118	3595	4212	4673
	40	-356	-194	16	174	347	2258	2688	3103	3639	4040
50	5	2235	2800	3802	4852	6308	27547	32742	37843	44541	49616
	10	706	937	1335	1744	2303	9985	11770	13496	15729	17399
	15	309	471	737	1001	1356	6134	7235	8298	9670	10695
	20	100	243	456	659	924	4407	5205	5975	6969	7710
	25	-46	96	288	459	676	3424	4051	4655	5435	6016
	30	-157	-14	173	326	513	2790	3306	3803	4445	4923
	35	-246	-102	85	230	398	2347	2786	3208	3753	4159
	40	-319	-174	14	156	312	2020	2402	2769	3243	3596

TABLE F($s = 4$) (Continued)

n= 60		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
55	5	2032	2545	3456	4409	5730	24914	29586	34166	40169	44710
	10	642	852	1214	1585	2092	9030	10634	12182	14181	15673
	15	280	428	670	909	1232	5547	6536	7490	8718	9633
	20	90	220	415	598	840	3986	4703	5394	6283	6945
	25	-41	87	262	417	614	3097	3660	4202	4900	5419
	30	-142	-13	157	296	466	2524	2987	3434	4008	4435
	35	-223	-93	77	209	361	2123	2517	2896	3384	3747
	40	-289	-158	13	142	283	1827	2170	2500	2924	3240
60	5	1863	2333	3167	4040	5249	22741	26984	31139	36578	40687
	10	588	781	1112	1452	1917	8242	9697	11101	12909	14257
	15	257	393	613	833	1128	5063	5961	6825	7937	8763
	20	83	202	380	548	769	3638	4289	4915	5720	6318
	25	-38	79	240	382	562	2827	3338	3830	4461	4930
	30	-130	-12	144	271	427	2304	2725	3129	3649	4035
	35	-204	-85	71	191	331	1938	2296	2640	3081	3409
	40	-264	-144	12	130	259	1668	1980	2279	2663	2948

TABLE F($s = 4$) (Continued)

n= 80		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
3	5	52935	67319	94653	125855	173840	2020573	3095901	4611196	7612565	10992662
	10	18548	24130	34574	46365	64352	740530	1132686	1685110	2779127	4011104
	15	9966	13606	20221	27580	38730	454581	695587	1035075	1707379	2464459
	20	5683	8590	13575	18978	27073	325962	499077	742926	1225828	1769619
	25	2779	5487	9658	13986	20366	252653	387096	576467	951479	1373775
	30	256	3218	7015	10694	15988	205275	314733	468908	774216	1118019
	35	-2308	1300	5061	8335	12894	172147	264138	393707	650288	939216
	40	-4917	-548	3508	6544	10583	147692	226793	338202	558817	807245
4	5	38883	49148	68299	89650	121555	1020038	1424664	1930385	2801991	3660742
	10	13534	17542	24899	33006	45012	373251	519856	702901	1018171	1328680
	15	7199	9828	14511	19592	27061	229347	319576	432218	626213	817271
	20	4047	6155	9703	13450	18895	164664	229616	310698	450334	587854
	25	1934	3890	6872	9889	14198	127809	178373	241490	350185	457230
	30	172	2246	4965	7542	11135	103996	145267	196782	285494	372858
	35	-1485	886	3559	5863	8971	87347	122124	165529	240273	313881
	40	-3055	-362	2446	4589	7357	75059	105042	142463	206899	270354
5	5	30839	38846	53629	69887	93784	665776	889244	1151841	1573556	1961673
	10	10687	13826	19526	25718	34736	243356	323856	418269	569682	708913
	15	5649	7714	11354	15245	20869	149618	199203	257345	350574	436294
	20	3147	4807	7572	10451	14561	107501	143245	185153	252348	314128
	25	1483	3018	5348	7672	10934	83507	111377	144050	196434	244595
	30	129	1726	3851	5842	8569	68006	90790	117500	160321	199688
	35	-1094	672	2749	4533	6899	57169	76400	98941	135078	168300
	40	-2213	-270	1880	3541	5654	49171	65778	85243	116447	145132
10	5	15278	19121	26070	33510	44103	234231	291136	351227	436744	506768
	10	5243	6763	9464	12318	16342	85396	105510	126619	156497	180861
	15	2733	3740	5476	7281	9804	52562	64968	77979	96383	111384
	20	1494	2305	3632	4975	6830	37822	46793	56198	69498	80338
	25	686	1427	2549	3640	5121	29427	36446	43803	54206	62683
	30	58	801	1822	2762	4007	24004	29763	35798	44331	51284
	35	-472	304	1290	2135	3222	20213	25091	30203	37429	43316
	40	-929	-119	872	1661	2636	17415	21643	26072	32334	37435
15	5	10178	12713	17262	22091	28893	140703	171438	202883	246082	280268
	10	3480	4486	6259	8117	10708	51246	62003	72911	87772	99454
	15	1805	2472	3615	4793	6420	31554	38191	44914	54064	61251
	20	980	1518	2393	3271	4470	22717	27521	32385	39004	44201
	25	446	935	1676	2391	3350	17684	21448	25258	30440	34509
	30	37	522	1195	1812	2620	14433	17525	20655	24911	28252
	35	-301	197	843	1398	2105	12160	14783	17437	21046	23879
	40	-588	-76	568	1086	1722	10482	12759	15062	18193	20651
20	5	7635	9526	12909	16484	21493	100373	121164	142116	170422	192465
	10	2606	3357	4678	6056	7966	36537	43772	50984	60629	68075
	15	1348	1847	2699	3573	4775	22501	26985	31410	37348	41924
	20	730	1132	1785	2438	3324	16204	19437	22654	26949	30261
	25	330	695	1248	1780	2490	12617	15152	17673	21039	23633
	30	27	387	889	1348	1947	10300	12384	14457	17223	19354
	35	-221	145	626	1040	1564	8681	10450	12209	14555	16364
	40	-430	-56	421	807	1279	7485	9021	10549	12586	14156

TABLE F($s = 4$) (Continued)

n= 80		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
25	5	6109	7618	10311	13149	17113	77968	93611	109238	130144	146272
	10	2082	2682	3735	4830	6343	28372	33794	39146	46223	51629
	15	1076	1474	2154	2849	3802	17475	20821	24118	28472	31794
	20	581	902	1423	1943	2645	12586	15010	17398	20549	22953
	25	262	554	995	1418	1981	9802	11703	13575	16045	17928
	30	22	307	708	1074	1549	8003	9567	11106	13137	14685
	35	-175	115	498	828	1244	6746	8074	9381	11105	12419
	40	-339	-45	335	642	1017	5818	6972	8107	9604	10745
30	5	5092	6347	8584	10937	14217	63726	76243	88673	105200	117870
	10	1734	2234	3109	4017	5270	23183	27511	31752	37321	41544
	15	895	1227	1792	2369	3158	14280	16950	19563	22988	25583
	20	483	750	1184	1615	2197	10286	12221	14114	16593	18470
	25	218	460	827	1179	1646	8012	9529	11014	12957	14429
	30	18	255	588	892	1286	6542	7791	9012	10610	11820
	35	-144	95	414	688	1033	5515	6576	7613	8970	9997
	40	-280	-37	278	533	844	4757	5679	6580	7759	8651
35	5	4365	5439	7353	9363	12159	53877	64300	74609	88253	98669
	10	1486	1914	2662	3438	4507	19597	23193	26701	31282	34739
	15	766	1051	1534	2028	2701	12072	14291	16452	19269	21392
	20	413	642	1013	1382	1879	8696	10304	11869	13909	15445
	25	186	393	708	1008	1407	6774	8035	9263	10862	12067
	30	15	218	503	763	1100	5532	6570	7580	8896	9886
	35	-123	81	354	588	883	4664	5546	6404	7521	8362
	40	-238	-31	237	456	722	4023	4790	5535	6506	7237
40	5	3820	4759	6430	8184	10622	46662	55587	64388	75997	84831
	10	1300	1674	2328	3006	3937	16971	20045	23033	26920	29843
	15	670	919	1341	1772	2359	10454	12351	14192	16582	18376
	20	361	561	886	1208	1641	7531	8906	10240	11970	13268
	25	162	343	618	881	1229	5867	6946	7992	9349	10367
	30	13	190	439	667	960	4791	5680	6540	7657	8494
	35	-107	71	309	514	771	4040	4794	5526	6474	7185
	40	-207	-27	207	398	630	3485	4141	4777	5601	6218
45	5	3396	4230	5714	7270	9430	41150	48951	56626	66723	74389
	10	1155	1487	2068	2670	3496	14964	17648	20250	23623	26152
	15	595	816	1192	1574	2094	9219	10875	12477	14551	16103
	20	320	498	786	1072	1457	6641	7842	9003	10504	11628
	25	144	305	549	782	1091	5174	6116	7027	8205	9085
	30	12	169	390	592	853	4226	5001	5751	6720	7444
	35	-95	63	274	456	685	3563	4222	4859	5682	6297
	40	-183	-24	184	353	559	3074	3647	4200	4916	5451
50	5	3057	3807	5141	6539	8479	36801	43729	50531	59464	66231
	10	1039	1338	1861	2401	3143	13382	15763	18065	21044	23272
	15	535	734	1072	1415	1883	8244	9713	11131	12962	14330
	20	288	448	707	964	1310	5939	7004	8032	9358	10347
	25	129	274	494	704	981	4627	5463	6269	7309	8085
	30	11	152	351	532	766	3779	4468	5131	5987	6625
	35	-85	57	246	410	615	3187	3772	4335	5062	5605
	40	-165	-22	165	318	503	2749	3258	3748	4380	4851

TABLE F($s = 4$) (Continued)

n= 80		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
55	5	2779	3461	4672	5942	7702	33284	39513	45620	53627	59683
	10	945	1217	1691	2182	2855	12102	14241	16306	18972	20962
	15	486	667	974	1286	1710	7456	8775	10047	11686	12907
	20	262	407	643	876	1190	5372	6328	7250	8437	9320
	25	117	249	449	639	891	4185	4936	5659	6590	7283
	30	10	138	319	483	696	3418	4037	4632	5398	5968
	35	-77	51	224	372	559	2882	3408	3914	4564	5049
	40	-149	-20	150	288	457	2487	2944	3384	3949	4370
60	5	2548	3172	4282	5444	7055	30379	36038	41578	48832	54311
	10	866	1115	1550	1999	2615	11045	12987	14859	17271	19069
	15	446	611	893	1178	1567	6805	8003	9155	10638	11741
	20	240	373	589	803	1090	4903	5771	6607	7680	8478
	25	108	228	411	586	816	3820	4502	5157	5999	6625
	30	9	126	292	443	638	3120	3682	4221	4914	5429
	35	-71	47	205	341	512	2631	3108	3567	4156	4593
	40	-136	-18	137	264	418	2270	2685	3084	3596	3976
65	5	2352	2928	3952	5024	6509	27941	33124	38194	44823	49825
	10	799	1029	1430	1845	2413	10158	11936	13647	15849	17488
	15	411	564	824	1087	1445	6259	7355	8409	9762	10768
	20	221	344	543	741	1005	4509	5304	6068	7048	7776
	25	99	210	379	540	753	3513	4137	4737	5506	6076
	30	8	116	269	409	588	2870	3384	3877	4510	4979
	35	-65	43	189	315	472	2420	2857	3276	3814	4213
	40	-126	-17	127	244	386	2088	2468	2832	3300	3647
70	5	2184	2719	3669	4664	6041	25865	30646	35319	41422	46023
	10	742	956	1328	1712	2239	9403	11042	12618	14644	16150
	15	382	524	765	1009	1342	5793	6804	7775	9020	9943
	20	205	319	504	688	933	4174	4907	5610	6512	7181
	25	92	195	352	501	699	3252	3828	4380	5087	5611
	30	8	108	250	379	546	2657	3131	3585	4167	4598
	35	-60	40	175	292	438	2240	2643	3029	3524	3890
	40	-117	-15	118	226	358	1933	2283	2619	3049	3368
75	5	2039	2538	3424	4352	5636	24076	28513	32846	38501	42760
	10	693	892	1239	1598	2089	8753	10272	11733	13608	15001
	15	356	489	714	942	1252	5393	6330	7229	8382	9236
	20	191	298	471	641	871	3885	4565	5217	6052	6670
	25	86	182	328	468	652	3027	3561	4073	4727	5212
	30	7	101	233	354	509	2473	2913	3334	3873	4271
	35	-56	37	164	272	409	2085	2459	2817	3275	3614
	40	-109	-14	110	211	334	1799	2124	2436	2834	3129
80	5	1911	2379	3210	4079	5282	22519	26657	30696	35964	39929
	10	649	836	1162	1498	1958	8186	9603	10964	12709	14005
	15	334	458	669	883	1173	5044	5918	6756	7828	8623
	20	179	279	441	601	816	3634	4268	4875	5652	6227
	25	80	171	308	438	611	2631	3329	3806	4415	4866
	30	7	94	218	332	477	2313	2723	3115	3617	3988
	35	-53	35	153	255	383	1950	2299	2633	3059	3374
	40	-102	-14	103	198	313	1683	1986	2276	2647	2921

TABLE F($s = 4$) (Continued)

n= 100		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
3	5	66883	84873	119076	158130	218198	2530125	3876324	5773313	9530711	13762235
	10	24092	31027	44069	58832	81379	930031	1422245	2115623	3488783	5035106
	15	13621	18046	26234	35425	49403	572538	875779	1302934	2148854	3101441
	20	8607	11983	18043	24748	34879	411704	630041	937594	1546652	2232508
	25	5474	8355	13270	18585	26542	320003	489959	729358	1203444	1737308
	30	3140	5849	10101	14546	21113	260712	399396	594742	981587	1417208
	35	1105	3927	7810	11675	17286	219229	336040	500572	826393	1193294
	40	-919	2309	6048	9516	14436	188587	289243	431017	711769	1027917
4	5	49168	62001	85956	112671	152596	1277088	1783492	2416418	3507260	4582013
	10	17628	22599	31773	41912	56947	468577	652448	882023	1277434	1666875
	15	9897	13083	18865	25195	34541	288661	402045	543595	787380	1027474
	20	6198	8638	12935	17570	24364	207769	289540	391620	567422	740559
	25	3894	5983	9483	13170	18523	161662	225431	305035	442125	577137
	30	2194	4154	7192	10288	14721	131856	183994	249075	361153	471531
	35	751	2757	5539	8241	12043	111007	155010	209935	304521	397671
	40	-604	1596	4269	6703	10050	95608	133604	181030	262698	343126
5	5	39017	49024	67510	87847	117745	833478	1113100	1441684	1969367	2455008
	10	13945	17834	24935	32673	43958	305433	406342	524693	714495	889027
	15	7794	10293	14779	19621	26648	188234	250490	323492	440549	548178
	20	4853	6773	10115	13667	18786	135561	180507	233207	317704	395393
	25	3026	4671	7399	10233	14274	105544	140637	181782	247750	308401
	30	1686	3226	5599	7984	11338	86141	114870	148550	202549	252194
	35	568	2127	4301	6387	9270	72569	96847	125308	170937	212887
	40	-450	1220	3305	5188	7732	62545	83537	108144	147592	183859
10	5	19353	24152	32836	42138	55383	293177	364349	439503	546458	634036
	10	6869	8747	12105	15666	20693	107125	132307	158734	196141	226644
	15	3801	5015	7148	9386	12530	66072	81618	97920	120982	139779
	20	2338	3274	4871	6522	8822	47638	58886	70680	87361	100954
	25	1435	2238	3548	4871	6694	37135	45942	55174	68230	78868
	30	783	1528	2671	3790	5311	30347	37578	45156	55872	64603
	35	257	994	2040	3024	4337	25600	31728	38150	47230	54629
	40	-197	560	1558	2449	3613	22094	27407	32976	40848	47262
15	5	12899	16062	21747	27783	36286	176101	214534	253855	307873	350622
	10	4566	5807	8011	10327	13561	64273	77735	91385	109981	124599
	15	2518	3322	4724	6183	8209	39653	47963	56380	67837	76835
	20	1542	2163	3215	4292	5777	28601	34619	40712	49003	55514
	25	941	1473	2337	3202	4382	22304	27021	31795	38291	43390
	30	510	1002	1757	2489	3474	18235	22112	26035	31372	35561
	35	166	649	1339	1984	2836	15389	18678	22007	26533	30087
	40	-126	363	1020	1605	2362	13287	16142	19031	22960	26044
20	5	9677	12038	16265	20732	26994	125620	151616	177814	213207	240767
	10	3421	4348	5989	7706	10090	45821	54872	63895	75961	85277
	15	1883	2484	3529	4611	6106	28273	33859	39422	46851	52581
	20	1150	1615	2400	3200	4296	20396	24444	28472	33850	37996
	25	700	1098	1743	2386	3258	15910	19083	22241	26456	29705
	30	378	746	1309	1854	2583	13010	15620	18216	21681	24352
	35	122	482	997	1477	2108	10982	13198	15401	18342	20608
	40	-93	269	759	1194	1755	9484	11409	13323	15876	17844

TABLE F($s = 4$) (Continued)

n= 100		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
25	5	7745	9628	12992	16539	21493	97578	117137	136674	162813	182977
	10	2735	3476	4783	6147	8035	35579	42362	49056	57908	64670
	15	1504	1984	2817	3677	4862	21955	26141	30267	35715	39871
	20	917	1289	1915	2551	3420	15840	18874	21862	25807	28815
	25	557	876	1390	1902	2593	12357	14737	17080	20173	22531
	30	300	594	1043	1477	2055	10107	12064	13991	16534	18473
	35	97	383	794	1176	1677	8532	10195	11831	13990	15636
	40	-74	214	604	951	1396	7369	8814	10236	12111	13540
30	5	6456	8022	10816	13757	17856	79752	95401	110943	131605	147446
	10	2279	2895	3981	5112	6675	29072	34484	39789	46753	52035
	15	1252	1652	2344	3058	4039	17941	21280	24549	28834	32079
	20	763	1072	1593	2121	2841	12945	15366	17734	20836	23185
	25	463	728	1156	1581	2154	10100	11999	13856	16289	18130
	30	249	493	867	1228	1707	8261	9823	11351	13352	14866
	35	80	318	660	977	1393	6975	8302	9600	11299	12584
	40	-61	177	501	790	1159	6025	7178	8306	9782	10899
35	5	5535	6875	9265	11777	15272	67426	80457	93345	110403	123425
	10	1953	2481	3410	4376	5710	24574	29071	33458	39187	43511
	15	1072	1415	2007	2617	3454	15165	17940	20643	24167	26823
	20	653	918	1363	1815	2430	10943	12955	14913	17465	19387
	25	396	623	989	1353	1842	8538	10117	11653	13654	15161
	30	213	422	742	1050	1460	6984	8283	9547	11193	12433
	35	69	272	564	836	1191	5897	7001	8074	9472	10525
	40	-52	151	429	676	991	5094	6054	6987	8202	9116
40	5	4844	6016	8103	10295	13342	58396	69554	80556	95070	106114
	10	1709	2170	2982	3826	4988	21280	25124	28861	33722	37377
	15	938	1237	1755	2288	3018	13133	15505	17807	20797	23041
	20	571	803	1192	1586	2122	9477	11197	12865	15029	16654
	25	346	544	865	1182	1609	7395	8744	10053	11751	13024
	30	186	369	648	918	1275	6049	7160	8237	9633	10681
	35	60	237	493	730	1040	5108	6052	6966	8153	9042
	40	-45	132	375	590	866	4412	5233	6028	7059	7833
45	5	4306	5347	7200	9144	11845	51497	61250	70845	83469	93051
	10	1519	1929	2649	3398	4428	18764	22120	25373	29592	32754
	15	833	1099	1559	2032	2679	11580	13651	15655	18249	20190
	20	507	713	1059	1409	1884	8357	9858	11310	13189	14594
	25	307	483	768	1050	1428	6521	7699	8838	10312	11414
	30	165	327	576	815	1132	5334	6304	7242	8454	9360
	35	53	210	438	649	923	4505	5329	6125	7155	7925
	40	-40	117	332	524	768	3892	4608	5301	6196	6865
50	5	3876	4813	6479	8225	10650	46055	54716	63220	74386	82846
	10	1367	1735	2384	3056	3982	16780	19756	22636	26361	29146
	15	750	989	1403	1828	2409	10356	12193	13966	16256	17966
	20	456	641	952	1267	1694	7474	8805	10090	11749	12986
	25	276	435	691	944	1284	5832	6877	7885	9186	10157
	30	148	294	518	733	1017	4771	5631	6461	7531	8330
	35	48	189	394	583	830	4029	4760	5465	6374	7053
	40	-36	105	299	471	691	3481	4117	4730	5520	6109

TABLE F($s = 4$) (Continued)

n= 100		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
55	5	3524	4375	5888	7474	9674	41653	49440	57075	67084	74655
	10	1242	1577	2166	2777	3617	15175	17849	20431	23764	26253
	15	681	899	1275	1661	2188	9365	11015	12606	14655	16182
	20	414	583	865	1151	1539	6759	7955	9108	10592	11697
	25	251	395	628	858	1166	5274	6213	7118	8282	9148
	30	135	267	470	666	924	4315	5088	5832	6790	7503
	35	43	172	358	530	754	3644	4301	4933	5747	6353
	40	-33	95	271	428	627	3148	3720	4269	4977	5504
60	5	3231	4011	5397	6849	8862	38018	45092	52019	61086	67936
	10	1139	1446	1985	2545	3313	13850	16277	18617	21633	23881
	15	624	824	1168	1521	2004	8548	10045	11487	13341	14720
	20	380	534	793	1055	1409	6169	7255	8299	9642	10640
	25	230	362	575	786	1068	4814	5666	6486	7539	8322
	30	123	245	431	610	846	3938	4640	5315	6181	6826
	35	40	157	328	485	690	3326	3922	4496	5232	5779
	40	-30	87	249	392	575	2874	3392	3891	4531	5007
65	5	2983	3702	4981	6320	8175	34967	41446	47784	56071	62325
	10	1051	1335	1832	2348	3057	12737	14959	17099	19852	21902
	15	576	760	1078	1404	1849	7861	9232	10550	12242	13499
	20	350	493	732	973	1300	5674	6668	7622	8848	9758
	25	212	334	531	725	985	4428	5208	5957	6919	7632
	30	114	226	398	563	781	3622	4265	4882	5673	6260
	35	36	145	302	448	637	3059	3605	4129	4802	5301
	40	-28	81	229	362	530	2643	3118	3574	4158	4592
70	5	2770	3438	4624	5867	7588	32369	38346	44187	51817	57569
	10	976	1239	1701	2180	2837	11790	13839	15809	18342	20225
	15	535	706	1001	1303	1716	7277	8541	9754	11311	12466
	20	325	457	679	903	1207	5252	6168	7048	8175	9011
	25	197	310	493	673	915	4099	4818	5508	6392	7048
	30	105	210	369	522	725	3353	3946	4514	5241	5781
	35	34	135	280	416	591	2832	3335	3818	4437	4895
	40	-26	75	213	336	492	2447	2885	3304	3842	4241
75	5	2585	3209	4316	5474	7079	30130	35677	41093	48162	53487
	10	911	1157	1588	2034	2647	10974	12875	14700	17045	18786
	15	499	659	934	1216	1601	6774	7946	9070	10511	11579
	20	303	427	634	843	1126	4889	5739	6553	7597	8370
	25	184	289	460	628	853	3815	4482	5122	5941	6547
	30	98	195	344	487	676	3121	3671	4197	4871	5370
	35	32	126	262	388	551	2636	3103	3551	4123	4547
	40	-24	70	199	313	459	2278	2684	3073	3571	3939
80	5	2424	3008	4045	5131	6634	28181	33355	38404	44988	49945
	10	854	1084	1488	1907	2481	10264	12036	13737	15919	17539
	15	468	618	875	1140	1500	6335	7428	8476	9817	10810
	20	284	400	594	790	1055	4572	5365	6124	7095	7814
	25	172	271	431	588	800	3568	4191	4786	5548	6112
	30	92	183	323	457	634	2919	3432	3922	4549	5013
	35	30	118	245	363	517	2465	2901	3318	3851	4245
	40	-22	65	186	293	430	2130	2509	2872	3335	3678

TABLE F($s = 4$) (Continued)

n= 100		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
85	5	2281	2831	3807	4828	6242	26468	31316	36045	42207	46842
	10	804	1020	1401	1794	2334	9640	11300	12892	14933	16446
	15	440	581	824	1073	1412	5950	6974	7954	9208	10136
	20	268	377	559	743	993	4294	5037	5747	6656	7327
	25	162	255	405	554	752	3351	3934	4492	5204	5731
	30	87	172	304	430	596	2742	3222	3681	4268	4701
	35	28	111	231	342	486	2316	2724	3114	3612	3981
	40	-21	61	175	276	405	2001	2356	2695	3129	3449
90	5	2155	2674	3595	4559	5894	24952	29513	33958	39749	44103
	10	759	964	1323	1694	2204	9088	10648	12145	14061	15482
	15	416	549	778	1013	1333	5609	6572	7493	8671	9542
	20	253	356	528	702	937	4048	4747	5414	6267	6898
	25	153	241	383	523	710	3159	3708	4232	4901	5395
	30	82	163	287	406	563	2585	3036	3468	4019	4425
	35	26	105	218	323	459	2183	2567	2934	3402	3747
	40	-20	58	165	261	382	1886	2220	2539	2946	3247
95	5	2042	2533	3406	4319	5582	23600	27906	32100	37562	41666
	10	719	913	1253	1605	2087	8595	10068	11479	13286	14624
	15	394	520	737	959	1262	5305	6214	7083	8193	9013
	20	239	337	500	665	888	3829	4488	5118	5922	6515
	25	145	228	363	495	673	2988	3506	4000	4631	5096
	30	77	154	272	384	533	2445	2871	3278	3797	4180
	35	25	99	206	306	435	2065	2427	2773	3214	3540
	40	-19	55	157	247	362	1784	2099	2400	2784	3067
100	5	1940	2406	3235	4102	5302	22387	26464	30435	35603	39484
	10	683	867	1190	1524	1982	8153	9547	10883	12592	13856
	15	374	494	700	911	1199	5032	5892	6715	7765	8540
	20	227	320	475	632	843	3632	4256	4852	5612	6173
	25	137	217	344	470	639	2835	3324	3792	4389	4829
	30	74	146	258	365	506	2319	2723	3108	3599	3961
	35	24	94	196	290	413	1959	2302	2629	3046	3354
	40	-18	52	149	234	344	1692	1991	2275	2638	2906

H.4 TABLE F($s = 5$): Two-Parameter Exponential Quantiles for Future Samples

n= 5		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
3	5	1092	3850	7483	11039	16199	209057	321650	480376	794834	1149004
	10	-30967	-18968	-8321	-2955	840	48286	74629	111706	185107	267751
	15	-52240	-34010	-17835	-9682	-3917	25038	39154	59002	98276	142488
	20	-66395	-44020	-24165	-14158	-7083	15818	25041	37995	63615	92452
	25	-76351	-51060	-28617	-17307	-9309	11037	17692	27028	45482	66249
	30	-83699	-56255	-31904	-19630	-10952	8187	13290	20440	34566	50458
	35	-89333	-60239	-34423	-21412	-12212	6332	10411	16119	27388	40064
	40	-93786	-63388	-36414	-22820	-13207	5048	8409	13105	22370	32790
4	5	742	2713	5327	7812	11295	106156	149145	202946	295753	387234
	10	-15603	-10321	-4973	-1884	568	24911	35099	47795	69643	91150
	15	-23836	-16856	-9787	-5705	-2465	13209	18849	25865	37925	49791
	20	-28789	-20787	-12684	-8004	-4290	8513	12308	17021	25113	33071
	25	-32090	-23407	-14614	-9536	-5506	6045	8856	12340	18315	24188
	30	-34445	-25276	-15992	-10630	-6374	4554	6761	9489	14164	18757
	35	-36209	-26676	-17023	-11448	-7024	3571	5373	7595	11399	15134
	40	-37580	-27764	-17825	-12085	-7529	2882	4396	6258	9441	12566
5	5	561	2097	4147	6065	8700	69528	93533	121810	167303	209217
	10	-10240	-7020	-3536	-1382	429	16444	22145	28814	39492	49303
	15	-14948	-10979	-6684	-4029	-1797	8820	12035	15785	21780	27284
	20	-17640	-13242	-8484	-5543	-3070	5742	7942	10500	14585	18331
	25	-19386	-14710	-9651	-6525	-3896	4114	5767	7684	10741	13542
	30	-20610	-15740	-10470	-7213	-4475	3124	4438	5958	8378	10594
	35	-21517	-16503	-11077	-7723	-4904	2466	3552	4804	6793	8614
	40	-22216	-17090	-11544	-8116	-5234	2003	2925	3984	5664	7202

TABLE F($s = 5$) (Continued)

n= 6		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
3	5	3508	6063	10038	14186	20343	254158	390741	583286	864745	1394378
	10	-23968	-14019	-5191	-742	2469	60411	93091	139099	230183	332743
	15	-44328	-28415	-14296	-7180	-2148	31902	49629	74564	123914	179473
	20	-58658	-38548	-20705	-11712	-5352	20426	32098	48503	80957	117489
	25	-69081	-45919	-25366	-15008	-7683	14405	22872	34760	58268	84727
	30	-76949	-51482	-28885	-17496	-9442	10783	17299	26440	44508	64841
	35	-83080	-55817	-31626	-19434	-10813	8406	13630	20948	35408	51677
	40	-87983	-59284	-33819	-20985	-11910	6751	11064	17098	29016	42423
4	5	2470	4335	7181	10063	14197	128871	180886	245982	358272	468958
	10	-12597	-7935	-3215	-489	1701	30980	43502	59114	85983	112437
	15	-20904	-14528	-8073	-4344	-1385	16674	23658	32353	47306	62021
	20	-26124	-18671	-11125	-6767	-3308	10866	15588	21456	31539	41458
	25	-29693	-21505	-13213	-8424	-4623	7786	11294	15645	23115	30461
	30	-32284	-23561	-14728	-9627	-5578	5912	8670	12086	17945	23704
	35	-34249	-25120	-15877	-10539	-6301	4669	6923	9710	14486	19178
	40	-35790	-26343	-16778	-11254	-6869	3794	5689	8026	12029	15960
5	5	1907	3380	5608	7824	10941	84336	113333	147491	202444	253075
	10	-8430	-5498	-2325	-364	1298	20385	27355	35512	48577	60582
	15	-13308	-9600	-5587	-3107	-1022	11080	15030	19643	27020	33795
	20	-16203	-12034	-7523	-4735	-2390	7287	9996	13153	18197	22826
	25	-18121	-13647	-8806	-5814	-3298	5264	7303	9674	13457	16926
	30	-19487	-14796	-9719	-6582	-3944	4026	5649	7531	10530	13280
	35	-20509	-15655	-10403	-7156	-4427	3200	4541	6092	8561	10822
	40	-21302	-16322	-10933	-7603	-4802	2616	3754	5067	7155	9066
6	5	1553	2772	4606	6409	8913	62163	81441	103333	137105	166976
	10	-6309	-4198	-1820	-290	1050	15073	19688	24881	32839	39847
	15	-9679	-7132	-4263	-2417	-809	8244	10886	13851	18387	22378
	20	-11611	-8814	-5663	-3636	-1871	5452	7282	9330	12458	15208
	25	-12868	-9908	-6574	-4429	-2561	3958	5347	6898	9262	11339
	30	-13752	-10678	-7215	-4987	-3047	3040	4154	5394	7282	8939
	35	-14409	-11249	-7691	-5401	-3407	2426	3353	4382	5945	7317
	40	-14915	-11690	-8058	-5720	-3685	1991	2782	3658	4988	6153

TABLE F($s = 5$) (Continued)

n= 7		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
3	5	5429	8072	12509	17286	24459	299301	459898	686296	1134824	1639995
	10	-18539	-10180	-2763	976	3929	72686	111776	166812	275781	398479
	15	-37757	-23769	-11357	-5102	-679	38944	60361	90497	150147	217305
	20	-51975	-33823	-17716	-9598	-3858	25207	39405	59368	98869	143338
	25	-62641	-41365	-22486	-12971	-6243	17932	28280	42817	71574	103941
	30	-70861	-47177	-26162	-15571	-8081	13521	21513	32732	54916	79883
	35	-77364	-51775	-29070	-17627	-9535	10609	17031	26039	43843	63879
	40	-82625	-55496	-31423	-19290	-10711	8570	13882	21326	36035	52583
4	5	3885	5815	8977	12281	17082	151610	212659	289062	420854	550764
	10	-10120	-5969	-1766	661	2726	37115	51993	70547	102485	133929
	15	-18359	-12508	-6584	-3163	-448	20214	28565	38968	56860	74471
	20	-23740	-16780	-9731	-5661	-2430	13292	18960	26010	38128	50052
	25	-27508	-19770	-11935	-7410	-3818	9594	13815	19059	28064	36922
	30	-30287	-21975	-13560	-8699	-4842	7331	10656	14781	21860	28821
	35	-32418	-23667	-14806	-9689	-5627	5822	8543	11913	17693	23374
	40	-34105	-25006	-15793	-10472	-6248	4755	7044	9874	14725	19491
5	5	3030	4556	7024	9559	13171	99160	133154	173198	237620	296975
	10	-6894	-4206	-1297	500	2091	24366	32614	42271	57741	71958
	15	-11853	-8376	-4614	-2289	-334	13385	18080	23566	32345	40408
	20	-14895	-10934	-6648	-3999	-1772	8874	12102	15868	21888	27415
	25	-16952	-12664	-8024	-5156	-2745	6453	8886	11720	16244	20395
	30	-18436	-13912	-9016	-5991	-3447	4964	6902	9154	12747	16042
	35	-19557	-14855	-9766	-6621	-3977	3966	5568	7426	10387	13100
	40	-20434	-15592	-10353	-7114	-4391	3258	4618	6192	8697	10992
7	5	2106	3187	4910	6645	9063	57626	74193	92550	120088	143789
	10	-4184	-2637	-847	336	1428	14208	18180	22533	29006	34544
	15	-6840	-5003	-2878	-1473	-221	7876	10172	12681	16406	19589
	20	-8368	-6364	-4047	-2514	-1149	5266	6869	8615	11205	13415
	25	-9367	-7254	-4810	-3195	-1755	3859	5083	6414	8384	10065
	30	-10072	-7882	-5349	-3675	-2183	2989	3976	5046	6628	7976
	35	-10596	-8349	-5750	-4032	-2501	2403	3228	4120	5437	6558
	40	-11001	-8710	-6060	-4308	-2747	1985	2692	3456	4580	5537

TABLE F($s = 5$) (Continued)

n= 8		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
3	5	7144	9980	14932	20357	28558	344469	529096	789369	1305006	1885761
	10	-14254	-7150	-847	2366	5320	85059	130607	194741	321727	464715
	15	-32248	-19874	-8894	-3360	553	46112	71279	106698	176810	255750
	20	-46170	-29718	-15120	-7763	-2560	30118	46899	70503	117214	169801
	25	-56912	-37314	-19924	-11159	-4962	21583	33865	51129	85285	123733
	30	-65354	-43283	-23699	-13829	-6850	16374	25890	39257	65696	95453
	35	-72127	-48073	-26728	-15971	-8364	12916	20582	31342	52618	76561
	40	-77668	-51991	-29206	-17723	-9603	10483	16836	25747	43360	63180
4	5	5159	7222	10739	14480	19956	174363	244453	332169	483477	632623
	10	-8052	-4328	-557	1634	3703	43295	60545	82060	119097	155565
	15	-16134	-10742	-5283	-2130	372	23808	33543	45873	66542	87084
	20	-21599	-15080	-8479	-4667	-1641	15772	22402	30654	44842	58805
	25	-25509	-18183	-10766	-6482	-3082	11454	16403	22556	33130	43531
	30	-28436	-20507	-12477	-7840	-4160	8797	12703	17553	25881	34072
	35	-30706	-22308	-13805	-8894	-4996	7018	10218	14187	20997	27694
	40	-32517	-23746	-14864	-9735	-5663	5756	8451	11787	17510	23134
5	5	4046	5676	8415	11279	15393	113994	152987	198921	272817	340901
	10	-5574	-3096	-415	1249	2846	28374	37908	49073	66962	83402
	15	-10554	-7284	-3746	-1559	280	15721	21168	27537	37731	47096
	20	-13700	-9929	-5849	-3328	-1207	10492	14246	18629	25639	32075
	25	-15867	-11752	-7299	-4548	-2232	7671	10506	13809	19087	23931
	30	-17451	-13083	-8357	-5437	-2981	5929	8189	10818	15015	18865
	35	-18658	-14098	-9165	-6116	-3551	4757	6626	8797	12259	15434
	40	-19609	-14898	-9801	-6650	-4001	3923	5510	7350	10283	12970
8	5	2463	3470	5127	6816	9175	54555	69378	85518	109250	129283
	10	-2881	-1666	-235	732	1686	13612	17162	20976	26526	31177
	15	-5094	-3671	-1994	-863	161	7621	9686	11899	15113	17802
	20	-6374	-4830	-3010	-1784	-673	5137	6586	8135	10381	12259
	25	-7213	-5590	-3677	-2388	-1220	3790	4902	6088	7805	9239
	30	-7807	-6129	-4150	-2816	-1608	2954	3854	4811	6195	7350
	35	-8251	-6530	-4502	-3135	-1897	2388	3143	3943	5099	6063
	40	-8594	-6841	-4775	-3382	-2121	1983	2632	3318	4308	5133

TABLE F($s = 5$) (Continued)

n= 9		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
3	5	8752	11828	17324	23408	32645	389653	598319	892481	1475255	2131626
	10	-10819	-4721	689	3589	6675	97501	149539	222819	367916	531300
	15	-27590	-16580	-6811	-1887	1606	53374	82333	123096	203791	294649
	20	-41099	-26132	-12852	-6159	-1426	35128	54538	81845	135892	196739
	25	-51796	-33697	-17636	-9542	-3818	25331	39592	59643	99319	143984
	30	-60358	-39750	-21465	-12249	-5732	19318	30400	45973	76779	111455
	35	-67320	-44674	-24579	-14451	-7289	15308	24256	36821	61672	89641
	40	-73075	-48743	-27152	-16271	-8576	12475	19904	30330	50944	74142
4	5	6356	8587	12479	16665	22823	197126	276261	375296	546126	714516
	10	-6305	-2941	465	2505	4653	49507	69139	93629	135789	177302
	15	-14176	-9189	-4138	-1222	1098	27442	38574	52448	76319	99819
	20	-19667	-13547	-7349	-3770	-929	18294	25899	35368	51653	67681
	25	-23675	-16728	-9693	-5631	-2406	13354	19044	26122	38287	50258
	30	-26718	-19143	-11473	-7043	-3527	10301	14799	20388	29988	39433
	35	-29102	-21035	-12867	-8149	-4405	8250	11940	16519	24382	32114
	40	-31018	-22556	-13988	-9039	-5111	6790	9900	13754	20369	26872
5	5	5003	6763	9788	12989	17609	128834	172830	224655	308030	384845
	10	-4429	-2133	351	1926	3582	32402	43227	55907	76223	94896
	15	-9388	-6304	-2966	-903	834	18081	24287	31545	43165	53840
	20	-12605	-9009	-5117	-2712	-689	12134	16421	21427	29437	36792
	25	-14859	-10904	-6624	-3979	-1755	8914	12154	15933	21975	27521
	30	-16525	-12305	-7738	-4916	-2543	6916	9502	12514	17324	21738
	35	-17807	-13382	-8595	-5637	-3149	5569	7709	10198	14170	17814
	40	-18823	-14237	-9275	-6208	-3629	4607	6425	8536	11903	14990
9	5	2715	3677	5291	6948	9261	52340	65952	80581	101774	119404
	10	-2012	-1015	177	1003	1874	13177	16428	19870	24796	28857
	15	-3924	-2769	-1387	-442	425	7434	9334	11340	14204	16564
	20	-5035	-3787	-2295	-1275	-339	5043	6381	7790	9800	11454
	25	-5767	-4458	-2893	-1823	-842	3741	4771	5853	7395	8662
	30	-6287	-4935	-3319	-2213	-1200	2930	3765	4641	5887	6911
	35	-6675	-5291	-3636	-2505	-1467	2379	3081	3816	4859	5715
	40	-6977	-5568	-3883	-2731	-1675	1983	2588	3220	4115	4850

TABLE F($s = 5$) (Continued)

n= 10		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
3	5	10297	13638	19695	26445	36723	434848	667561	995621	1645551	2377559
	10	-8030	-2749	1947	4727	8005	109990	168545	251004	414280	598136
	15	-23622	-13774	-5036	-632	2554	60704	93490	139642	231013	333892
	20	-36647	-22984	-10861	-4751	-431	40217	62291	93351	154831	224050
	25	-47212	-30455	-15586	-8092	-2793	29158	45432	68320	113614	164606
	30	-55814	-36537	-19433	-10812	-4716	22339	35019	52844	88111	127810
	35	-62898	-41547	-22601	-13052	-6301	17772	28032	42447	70961	103055
	40	-68812	-45728	-25246	-14922	-7623	14534	23068	35050	58746	85414
4	5	7507	9924	14204	18841	25684	219896	308078	418435	608795	796434
	10	-4814	-1758	1340	3318	5588	55743	77765	105239	152539	199115
	15	-12443	-7813	-3125	-417	1761	31108	43645	59274	86170	112648
	20	-17918	-12158	-6326	-2958	-285	20849	29439	40138	58541	76655
	25	-21988	-15389	-8707	-4848	-1785	15287	21727	29741	43520	57080
	30	-25119	-17874	-10538	-6301	-2938	11837	16936	23275	34167	44884
	35	-27596	-19840	-11986	-7451	-3851	9512	13699	18901	27834	36620
	40	-29603	-21433	-13160	-8382	-4590	7852	11384	15767	23290	30688
5	5	5925	7828	11150	14691	19821	143679	192678	250397	343252	428802
	10	-3428	-1291	1022	2561	4305	36444	48565	62763	85514	106426
	15	-8336	-5419	-2262	-311	1345	20460	27428	35580	48635	60628
	20	-11598	-8162	-4443	-2145	-213	13797	18619	24254	33272	41554
	25	-13919	-10113	-5996	-3451	-1311	10175	13825	18086	24899	31154
	30	-15654	-11573	-7156	-4426	-2131	7922	10838	14237	19668	24652
	35	-17000	-12704	-8056	-5183	-2767	6399	8813	11624	16113	20232
	40	-18073	-13607	-8774	-5787	-3275	5307	7360	9746	13554	17046
10	5	2903	3836	5419	7051	9330	50666	63392	76930	96318	112264
	10	-1400	-555	467	1201	2018	12845	15875	19044	23521	27166
	15	-3093	-2122	-949	-137	617	7291	9067	10920	13532	15656
	20	-4081	-3037	-1775	-902	-94	4971	6225	7531	9369	10862
	25	-4734	-3642	-2322	-1408	-563	3704	4672	5677	7090	8237
	30	-5200	-4073	-2711	-1769	-897	2912	3698	4514	5659	6587
	35	-5549	-4397	-3003	-2039	-1147	2373	3035	3720	4680	5458
	40	-5821	-4649	-3231	-2250	-1342	1984	2556	3146	3971	4640

TABLE F($s = 5$) (Continued)

n= 12		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
3	5	13276	17188	24396	32491	44862	525261	806080	1201956	1986236	2869558
	10	-3834	218	4017	6869	10622	135064	206701	307590	507364	732320
	15	-17276	-9287	-2198	1378	4309	75514	116022	173054	285972	413116
	20	-29240	-17747	-7549	-2409	1229	50565	78047	116727	193296	279508
	25	-39373	-24912	-12080	-5613	-1040	36991	57372	86048	142805	206706
	30	-47883	-30930	-15886	-8304	-2943	28558	44514	66956	111365	161360
	35	-55059	-36004	-19095	-10573	-4548	22872	35833	54053	90102	130683
	40	-61159	-40317	-21823	-12503	-5912	18816	29630	44825	74883	108717
4	5	9729	12548	17625	23174	31395	265449	371732	504740	734169	960319
	10	-2416	146	2826	4853	7427	68261	95081	128546	186183	242899
	15	-9522	-5494	-1416	940	2993	38504	53876	73043	106033	138512
	20	-14878	-9746	-4549	-1548	836	26033	36615	49803	72492	94826
	25	-18995	-13014	-6957	-3458	-682	19228	27191	37107	54161	70946
	30	-22238	-15587	-8853	-4964	-1877	14983	21305	29171	42695	56003
	35	-24850	-17661	-10380	-6176	-2839	12107	17311	23780	34898	45837
	40	-26996	-19364	-11635	-7172	-3629	10045	14441	19903	29285	38514
5	5	7704	9918	13852	18083	24238	173377	232388	301897	413719	516742
	10	-1762	109	2182	3762	5729	44559	59279	76524	104161	129565
	15	-6515	-3888	-1044	713	2297	25257	33761	43714	59655	74303
	20	-9809	-6657	-3247	-1140	633	17165	23069	29974	41027	51181
	25	-12220	-8685	-4859	-2495	-507	12742	17222	22456	30830	38521
	30	-14059	-10231	-6089	-3529	-1377	9977	13562	17746	24436	30579
	35	-15507	-11448	-7057	-4343	-2061	8099	11072	14538	20077	25160
	40	-16676	-12431	-7839	-5001	-2614	6748	9278	12224	16929	21246
10	5	3803	4883	6749	8692	11418	61093	76392	92666	115972	135141
	10	-748	49	1023	1781	2693	15659	19315	23141	28546	32948
	15	-2498	-1572	-451	323	1067	8957	11103	13344	16504	19075
	20	-3550	-2546	-1331	-491	286	6144	7661	9242	11469	13279
	25	-4260	-3203	-1925	-1041	-222	4602	5773	6991	8704	10096
	30	-4773	-3678	-2354	-1438	-590	3634	4586	5574	6963	8091
	35	-5161	-4037	-2679	-1739	-869	2974	3774	4605	5770	6716
	40	-5466	-4320	-2934	-1975	-1087	2497	3187	3902	4905	5718
12	5	3165	4063	5607	7206	9434	48307	59825	71899	88904	102664
	10	-608	40	844	1472	2224	12373	15095	17894	21771	24870
	15	-2001	-1268	-368	265	879	7088	8690	10333	12604	14417
	20	-2822	-2039	-1077	-400	235	4869	6005	7168	8772	10052
	25	-3369	-2552	-1549	-844	-182	3652	4531	5429	6668	7654
	30	-3761	-2921	-1888	-1162	-480	2888	3605	4335	5341	6142
	35	-4056	-3198	-2143	-1402	-705	2366	2971	3586	4432	5105
	40	-4287	-3415	-2343	-1589	-881	1989	2511	3042	3772	4352

TABLE F($s = 5$) (Continued)

n= 15		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
3	5	17600	22415	31388	41521	57042	660910	1013911	1511538	2497398	3607757
	10	260	3176	6674	9916	14478	172816	264155	392795	647528	934372
	15	-10529	-4516	819	3698	6792	97960	150167	223681	369237	533136
	20	-20906	-11854	-3822	227	3258	66374	102102	152400	251979	364102
	25	-30185	-18415	-7971	-2708	1016	49051	75737	113296	187645	271356
	30	-38299	-24153	-11600	-5274	-800	38204	59219	88787	147311	213200
	35	-45357	-29143	-14756	-7505	-2378	30836	47988	72114	119860	173612
	40	-51506	-33491	-17506	-9450	-3753	25544	39913	60118	100098	145105
4	5	12954	16412	22715	29646	39943	333798	467241	634236	922289	1206222
	10	174	2225	4756	7040	10138	87112	121157	163641	236791	308824
	15	-6153	-2821	554	2583	4737	49707	69366	93885	136093	177650
	20	-11217	-6840	-2408	152	2255	33934	47546	64515	93717	122466
	25	-15276	-10062	-4782	-1732	689	25273	35561	48380	70434	92143
	30	-18573	-12679	-6710	-3263	-526	19837	28033	38240	55795	73074
	35	-21293	-14837	-8300	-4525	-1528	16132	22897	31318	45796	60044
	40	-23570	-16644	-9632	-5582	-2367	13460	19190	26317	38567	50620
5	5	10287	12997	17871	23148	30849	217940	291970	379171	519451	648692
	10	131	1714	3704	5476	7830	56779	75411	97242	132233	164399
	15	-4328	-2048	418	1987	3647	32519	43343	56017	76320	94978
	20	-7580	-4783	-1757	114	1727	22291	29838	38668	52809	65801
	25	-10046	-6857	-3406	-1273	521	16670	22414	29130	39880	49754
	30	-11977	-8480	-4697	-2359	-392	13138	17744	23127	31738	39647
	35	-13528	-9785	-5734	-3231	-1126	10725	14553	19021	26166	32727
	40	-14800	-10855	-6585	-3946	-1727	8983	12244	16048	22129	27711
10	5	5111	6426	8729	11144	14544	76738	95897	116277	145461	169465
	10	58	798	1767	2612	3690	19894	24492	29305	36107	41646
	15	-1733	-863	188	925	1706	11474	14178	17004	20991	24234
	20	-2850	-1897	-746	51	797	7925	9839	11835	14648	16936
	25	-3622	-2612	-1391	-547	235	5972	7449	8988	11155	12917
	30	-4190	-3138	-1867	-987	-172	4740	5941	7191	8949	10377
	35	-4627	-3543	-2232	-1325	-486	3897	4907	5957	7434	8633
	40	-4973	-3863	-2521	-1593	-734	3285	4157	5061	6332	7363
15	5	3409	4280	5791	7359	9538	46114	56553	67345	82303	94220
	10	38	520	1162	1718	2419	11928	14371	16839	20194	22827
	15	-1082	-547	121	603	1115	6896	8338	9792	11764	13308
	20	-1749	-1182	-473	33	519	4774	5800	6832	8230	9324
	25	-2198	-1609	-873	-348	152	3606	4402	5202	6283	7129
	30	-2523	-1918	-1163	-624	-111	2869	3519	4171	5053	5742
	35	-2769	-2152	-1383	-833	-309	2363	2913	3463	4207	4787
	40	-2963	-2337	-1555	-997	-466	1996	2472	2948	3590	4092

TABLE F($s = 5$) (Continued)

n= 20		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
3	5	24638	31010	42966	56517	77307	887031	1360361	2027611	3349512	4838346
	10	4223	6734	10692	14795	20804	235917	360194	535231	881845	1272156
	15	-3602	382	4143	7001	10774	135687	207557	308768	509175	734841
	20	-11708	-5350	292	3256	6287	93140	142817	212764	351258	507203
	25	-19491	-10853	-3189	674	3650	69632	107053	159735	264035	381475
	30	-26677	-15934	-6402	-1598	1818	54797	84479	126259	208969	302094
	35	-33201	-20548	-9320	-3661	340	44639	69017	103324	171233	247692
	40	-39088	-24710	-11953	-5523	-976	37287	57821	86710	143889	208265
4	5	18203	22764	31143	40395	54166	447740	626461	850116	1235898	1616160
	10	2998	4842	7688	10548	14593	118628	164754	222319	321439	419049
	15	-2276	256	2917	4949	7536	68532	95391	128899	186584	243385
	20	-6765	-3307	196	2268	4383	47294	66016	89366	129558	169129
	25	-10565	-6322	-2026	455	2530	35559	49788	67528	98057	128113
	30	-13783	-8876	-3908	-1039	1245	28146	39534	53727	78147	102186
	35	-16526	-11053	-5512	-2312	228	23063	32499	44255	64477	84382
	40	-18883	-12925	-6891	-3407	-641	19376	27393	37377	54547	71447
5	5	14492	18059	24528	31563	41849	292228	391300	507994	695715	868662
	10	2327	3789	6022	8227	11282	77210	102383	131882	179167	222634
	15	-1663	193	2254	3838	5814	44718	59437	76676	104298	129686
	20	-4734	-2389	147	1741	3373	30952	41265	53339	72679	90451
	25	-7173	-4441	-1484	343	1940	23344	31224	40445	55211	68777
	30	-9151	-6104	-2807	-769	948	18535	24875	32290	44161	55066
	35	-10785	-7478	-3900	-1688	171	15234	20515	26688	36586	45640
	40	-12156	-8631	-4816	-2459	-477	12837	17347	22614	31042	38782
10	5	7242	8964	12008	15217	19747	102820	128413	155637	194619	226682
	10	1099	1823	2910	3949	5331	26975	33146	39609	48742	56182
	15	-708	86	1058	1818	2734	15700	19339	23144	28514	32884
	20	-1880	-999	66	808	1577	10929	13507	16199	19997	23087
	25	-2717	-1774	-634	154	898	8290	10282	12361	15291	17674
	30	-3348	-2359	-1162	-335	432	6620	8241	9930	12310	14245
	35	-3843	-2817	-1576	-718	77	5471	6835	8256	10257	11882
	40	-4241	-3186	-1909	-1027	-209	4635	5812	7036	8759	10158
15	5	4840	5979	7974	10054	12954	61772	75708	90114	110082	125990
	10	719	1201	1923	2604	3499	16158	19428	22734	27228	30756
	15	-449	55	691	1193	1791	9420	11353	13303	15949	18022
	20	-1171	-631	42	526	1030	6569	7944	9330	11207	12678
	25	-1671	-1107	-403	99	584	4992	6059	7133	8587	9725
	30	-2040	-1458	-732	-214	280	3994	4865	5741	6926	7854
	35	-2325	-1730	-986	-456	49	3306	4043	4782	5782	6563
	40	-2552	-1946	-1189	-648	-134	2806	3443	4083	4946	5621
20	5	3637	4488	5972	7511	9644	44070	53545	63210	76407	86764
	10	535	896	1436	1944	2606	11508	13696	15869	18767	21001
	15	-329	41	514	888	1332	6715	8010	9293	10999	12312
	20	-850	-461	31	390	765	4687	5610	6523	7737	8669
	25	-1206	-804	-296	73	433	3565	4283	4992	5934	6657
	30	-1466	-1055	-535	-157	207	2855	3442	4022	4791	5381
	35	-1665	-1247	-718	-334	36	2365	2863	3353	4002	4501
	40	-1823	-1400	-863	-474	-99	2009	2440	2865	3427	3858

TABLE F($s = 5$) (Continued)

n= 25		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
3	5	31588	39541	54503	71483	97550	1113175	1706850	2543746	4201731	6069089
	10	7079	9816	14510	19559	27063	299119	456396	677916	1116579	1610545
	15	446	3319	6816	10075	14664	173603	265237	394287	649826	937575
	20	-5931	-1265	2936	5709	9177	120170	183929	273713	451492	651675
	25	-12395	-5835	-15	3008	6010	90535	138847	206872	341557	493213
	30	-18623	-10240	-2801	949	3901	71751	110272	164504	271874	392771
	35	-24479	-14380	-5419	-903	2343	58828	90612	135352	223924	323652
	40	-29916	-18225	-7851	-2622	1076	49431	76312	114144	189034	273354
4	5	23385	29069	39540	51123	68374	561697	785704	1066028	1549554	2026159
	10	5123	7126	10478	13977	19004	150203	208435	281111	406253	529489
	15	300	2330	4861	7156	10273	87454	121550	164090	237331	309450
	20	-3640	-826	2046	4023	6413	60779	84657	114442	165715	216200
	25	-7117	-3586	-10	2091	4188	45991	64210	86931	126039	164543
	30	-10159	-6001	-1789	643	2706	36615	51246	69488	100881	131787
	35	-12823	-8114	-3347	-593	1612	30161	42320	57475	83553	109224
	40	-15163	-9972	-4715	-1680	730	25462	35819	48724	70926	92781
5	5	18642	23081	31160	39960	52839	366528	490644	636835	872006	1088665
	10	4023	5610	8230	10918	14704	97681	129408	166591	226192	280984
	15	226	1796	3787	5568	7935	56979	75611	97437	132412	164558
	20	-2622	-614	1572	3113	4945	39690	52791	68133	92712	115300
	25	-4965	-2584	-8	1604	3223	30106	40145	51897	70721	88019
	30	-6918	-4227	-1314	486	2076	24028	32125	41600	56773	70714
	35	-8569	-5614	-2418	-442	1230	19842	26600	34504	47160	58786
	40	-9979	-6800	-3361	-1235	553	16792	22573	29331	40149	50086
10	5	9345	11482	15276	19283	24945	128907	160934	195002	243784	283907
	10	1949	2736	4003	5259	6959	34069	41818	49932	61401	70743
	15	101	838	1808	2657	3742	19946	24523	29310	36067	41567
	20	-1090	-268	728	1468	2322	13955	17202	20595	25382	29277
	25	-1962	-1075	-3	742	1505	10634	13145	15768	19465	22473
	30	-2633	-1696	-564	219	962	8527	10571	12704	15710	18154
	35	-3166	-2190	-1010	-194	564	7074	8795	10590	13118	15174
	40	-3602	-2593	-1374	-531	250	6014	7499	9046	11225	12996
15	5	6253	7665	10148	12744	16367	77433	94866	112887	137865	157763
	10	1287	1812	2651	3473	4571	20395	24495	28640	34274	38697
	15	65	546	1189	1749	2454	11955	14381	16829	20150	22754
	20	-688	-172	474	961	1520	8377	10103	11843	14203	16051
	25	-1221	-679	-2	483	983	6393	7733	9082	10910	12342
	30	-1621	-1060	-359	141	627	5134	6228	7329	8820	9987
	35	-1934	-1358	-638	-124	366	4265	5189	6119	7376	8360
	40	-2186	-1598	-863	-338	161	3631	4431	5234	6321	7171
20	5	4702	5756	7603	9522	12186	55239	67089	79177	95682	108635
	10	961	1356	1983	2594	3404	14522	17262	19984	23615	26413
	15	48	405	886	1304	1826	8518	10140	11748	13889	15535
	20	-502	-126	351	715	1130	5973	7129	8274	9797	10967
	25	-886	-496	-2	358	730	4562	5461	6350	7531	8439
	30	-1171	-770	-263	104	465	3666	4401	5128	6093	6834
	35	-1392	-984	-466	-91	271	3048	3670	4285	5100	5726
	40	-1569	-1154	-629	-248	119	2596	3136	3668	4374	4915

TABLE F($s = 5$) (Continued)

n= 25		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
25	5	3768	4609	6079	7602	9707	42910	51855	60911	73169	82707
	10	767	1083	1584	2070	2713	11268	13313	15324	17976	19997
	15	38	322	706	1039	1455	6611	7823	9011	10574	11763
	20	-396	-100	279	569	900	4638	5503	6349	7462	8307
	25	-695	-390	-1	284	581	3544	4217	4875	5739	6396
	30	-916	-605	-208	83	369	2849	3400	3939	4645	5182
	35	-1087	-771	-367	-72	215	2370	2837	3292	3890	4343
	40	-1223	-903	-495	-196	94	2020	2425	2820	3338	3730

TABLE F($s = 5$) (Continued)

n= 30		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
3	5	38499	46043	66019	86434	117782	1339331	2053358	3059910	5054002	7299907
	10	9619	12725	18239	24267	33286	362368	552675	820720	1351515	1949230
	15	3031	5551	9282	13048	18504	211608	323058	480020	790832	1140823
	20	-2098	1447	5023	7986	12003	147332	225244	334964	552221	796861
	25	-7477	-2358	2202	4969	8281	111607	170896	254383	419690	605829
	30	-12844	-6153	-216	2849	5834	88903	136360	203181	335482	484453
	35	-18036	-9825	-2538	1135	4075	73238	112533	167855	277383	400709
	40	-22975	-13317	-4747	-428	2717	61812	95151	142081	234991	339603
4	5	28536	35350	47923	61839	82575	675661	944958	1281955	1863232	2436187
	10	7023	9284	13204	17366	23393	181807	252158	339960	491151	640040
	15	2123	3969	6660	9294	12977	106425	147777	199375	288211	375688
	20	-1354	989	3556	5656	8401	74331	103388	139639	202046	263495
	25	-4509	-1516	1521	3492	5784	56503	78740	106477	154222	201232
	30	-7345	-3767	-144	1978	4065	45175	63079	85407	123837	161675
	35	-9883	-5781	-1628	771	2829	37357	52271	70865	102865	134369
	40	-12154	-7584	-2956	-283	1875	31651	44380	60247	87550	114429
5	5	22768	28086	37779	48349	63824	440833	589996	765687	1048309	1308684
	10	5547	7334	10389	13579	18108	118172	156460	201334	273266	339393
	15	1635	3094	5209	7245	10032	69273	91829	118253	160598	199520
	20	-899	751	2757	4392	6485	48471	64372	82995	112836	140260
	25	-3220	-1117	1162	2698	4458	36918	49130	63429	86336	107387
	30	-5114	-2710	-108	1516	3127	29576	39444	50996	69497	86499
	35	-6744	-4080	-1197	584	2170	24509	32758	42412	57871	72076
	40	-8159	-5270	-2144	-212	1433	20809	27875	36141	49377	61537
10	5	11434	13991	18537	23344	30140	154995	193458	234371	292953	341135
	10	2721	3604	5073	6555	8580	41171	50497	60266	74071	85318
	15	760	1477	2510	3473	4739	24203	29720	35491	43638	50270
	20	-432	341	1303	2087	3053	16996	20913	25008	30787	35489
	25	-1321	-482	533	1267	2091	12994	16026	19194	23662	27297
	30	-2015	-1124	-48	700	1460	10450	12920	15498	19134	22090
	35	-2575	-1643	-516	264	1007	8693	10774	12944	16004	18492
	40	-3036	-2070	-902	-93	659	7409	9205	11077	13715	15860
15	5	7657	9345	12319	15431	19779	93094	114025	135661	165649	189539
	10	1805	2394	3365	4333	5638	24637	29566	34551	41327	46645
	15	495	970	1656	2289	3110	14497	17416	20362	24360	27494
	20	-276	221	854	1371	2001	10192	12271	14366	17208	19435
	25	-830	-307	346	829	1368	7802	9416	11041	13244	14970
	30	-1253	-709	-31	455	954	6283	7600	8927	10725	12132
	35	-1587	-1027	-328	171	656	5233	6346	7466	8983	10170
	40	-1858	-1286	-571	-60	428	4466	5429	6398	7709	8735
20	5	5760	7020	9231	11531	14726	66408	80634	95145	114958	130507
	10	1351	1793	2518	3237	4200	17539	20832	24103	28467	31830
	15	367	723	1236	1708	2315	10326	12276	14210	16784	18764
	20	-202	163	635	1021	1489	7264	8655	10032	11863	13271
	25	-605	-225	256	616	1017	5564	6645	7715	9137	10230
	30	-909	-518	-23	337	708	4483	5368	6242	7404	8296
	35	-1146	-747	-241	126	487	3737	4485	5224	6206	6959
	40	-1338	-932	-417	-44	317	3190	3839	4479	5329	5981

TABLE F($s = 5$) (Continued)

n= 30		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
25	5	4617	5622	7382	9207	11732	51585	62323	73193	87906	99356
	10	1080	1434	2012	2584	3347	13607	16063	18480	21666	24095
	15	292	576	986	1362	1845	8013	9469	10896	12775	14204
	20	-160	129	506	814	1186	5639	6678	7695	9033	10050
	25	-476	-178	203	490	810	4321	5129	5921	6960	7749
	30	-713	-408	-18	268	563	3483	4145	4792	5642	6287
	35	-897	-587	-190	100	387	2904	3464	4012	4731	5276
	40	-1045	-731	-329	-35	252	2480	2967	3441	4064	4536
30	5	3852	4689	6150	7663	9750	42162	50774	59448	71125	80160
	10	899	1194	1676	2151	2783	11111	13066	14974	17472	19363
	15	242	479	821	1133	1533	6545	7703	8831	10303	11414
	20	-132	107	420	676	985	4607	5434	6238	7287	8078
	25	-393	-147	169	407	672	3531	4175	4801	5616	6231
	30	-586	-336	-15	222	468	2847	3375	3887	4554	5056
	35	-737	-483	-157	83	321	2374	2821	3255	3819	4245
	40	-858	-601	-272	-29	209	2028	2416	2793	3282	3650

TABLE F($s = 5$) (Continued)

n= 35		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
3	5	45389	56528	77523	101376	138008	1565492	2399876	3576092	5906301	8530768
	10	12022	15550	21920	28942	39489	425643	648997	963590	1586564	2288079
	15	4994	7532	11650	15967	22314	249662	380957	565872	932037	1344360
	20	559	3407	6906	10178	14792	174568	266673	396386	653234	942458
	25	-3949	137	3952	6790	10506	132777	203093	302115	498184	718966
	30	-8576	-3135	1698	4486	7706	106173	162626	242119	399515	576746
	35	-13161	-6378	-358	2738	5713	87783	134655	200651	331319	478450
	40	-17613	-9526	-2349	1270	4203	74341	114209	170338	281466	406593
4	5	33671	41620	56296	72550	96772	789630	1104218	1497891	2176923	2846233
	10	8823	11381	15896	20734	27768	213427	295905	398843	576097	750654
	15	3570	5434	8389	11395	15662	125424	174044	234713	339169	442028
	20	376	2394	4927	7231	10364	87922	122174	164908	238480	310924
	25	-2484	91	2779	4798	7348	67064	93337	126110	182530	238083
	30	-5111	-1994	1165	3147	5380	53790	74987	101426	146935	191743
	35	-7506	-3894	-237	1899	3980	44615	62304	84363	122330	159711
	40	-9682	-5622	-1510	865	2919	37907	53030	71886	104336	136284
5	5	26879	33081	44393	56733	74805	515141	689353	894544	1224621	1528713
	10	6992	9009	12522	16223	21503	138674	183528	236098	320367	397836
	15	2782	4261	6578	8893	12114	81586	108071	139100	188828	234536
	20	283	1847	3839	5627	8006	57276	75986	97900	133015	165289
	25	-1810	69	2146	3720	5669	43760	58154	75009	102015	126834
	30	-3629	-1461	886	2428	4145	35159	46808	60446	82294	102371
	35	-5219	-2797	-177	1455	3061	29213	38964	50378	68660	85459
	40	-6617	-3973	-1113	656	2240	24865	33228	43014	58686	73085
10	5	13517	16495	21795	27403	35335	181084	225983	273741	342123	398366
	10	3455	4448	6130	7844	10197	48277	59182	70605	86749	99900
	15	1325	2059	3187	4275	5730	28466	34924	41680	51219	58984
	20	127	862	1834	2686	3776	20044	24634	29432	36205	41716
	25	-768	31	1005	1761	2666	15363	18918	22632	27873	32137
	30	-1475	-625	404	1137	1943	12384	15280	18306	22573	26044
	35	-2052	-1159	-78	671	1429	10324	12765	15314	18907	21829
	40	-2532	-1603	-480	297	1040	8817	10924	13123	16223	18743
15	5	9057	11022	14488	18117	23190	108757	133185	158436	193435	221315
	10	2299	2960	4070	5187	6702	28881	34641	40465	48383	54598
	15	870	1360	2107	2821	3762	17043	20456	23900	28576	32241
	20	82	563	1207	1768	2476	12013	14443	16895	20221	22826
	25	-487	20	657	1156	1746	9217	11104	13007	15586	17606
	30	-925	-397	262	743	1271	7438	8980	10533	12638	14286
	35	-1275	-730	-50	436	933	6208	7510	8822	10598	11989
	40	-1562	-1003	-306	192	678	5307	6434	7568	9105	10307
20	5	6814	8281	10857	13540	17267	77578	94180	111114	134234	152380
	10	1723	2219	3047	3877	4994	20558	24403	28225	33322	37250
	15	648	1015	1575	2106	2802	12136	14415	16674	19682	21997
	20	60	417	899	1318	1843	8558	10183	11793	13934	15581
	25	-357	15	488	860	1299	6570	7834	9084	10747	12025
	30	-674	-291	193	552	945	5305	6338	7361	8719	9763
	35	-924	-533	-37	323	693	4430	5304	6168	7317	8199
	40	-1128	-730	-225	142	503	3789	4547	5295	6289	7052

TABLE F($s = 5$) (Continued)

n= 35		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
25	5	5463	6633	8683	10811	13756	60260	72790	85475	102644	116004
	10	1378	1775	2436	3096	3980	15947	18816	21637	25358	28194
	15	516	810	1257	1680	2232	9416	11116	12784	14979	16648
	20	48	332	717	1051	1468	6643	7856	9045	10608	11796
	25	-281	11	388	685	1034	5101	6045	6970	8184	9107
	30	-530	-230	153	439	752	4120	4893	5649	6642	7397
	35	-725	-420	-29	257	551	3441	4096	4736	5576	6213
	40	-883	-573	-177	112	400	2945	3512	4067	4794	5347
30	5	4559	5533	7235	8998	11432	49252	59301	69423	83047	93590
	10	1149	1479	2029	2577	3309	13022	15303	17532	20448	22656
	15	429	674	1046	1398	1856	7690	9042	10359	12079	13377
	20	40	275	596	874	1220	5426	6391	7331	8556	9480
	25	-232	10	322	569	859	4168	4919	5650	6602	7321
	30	-436	-190	127	364	624	3367	3983	4581	5360	5947
	35	-596	-346	-24	213	458	2813	3335	3841	4500	4997
	40	-726	-472	-147	93	332	2407	2860	3299	3870	4301
35	5	3912	4746	6201	7706	9781	41640	50022	58436	69717	78412
	10	985	1268	1739	2207	2832	11002	12893	14731	17124	18926
	15	367	577	896	1197	1588	6498	7619	8705	10115	11174
	20	34	235	510	748	1044	4586	5386	6161	7166	7920
	25	-198	8	275	487	735	3523	4146	4749	5531	6117
	30	-371	-162	109	311	534	2846	3357	3851	4491	4970
	35	-506	-294	-21	162	391	2378	2811	3230	3771	4177
	40	-616	-401	-125	79	283	2036	2412	2774	3244	3596

TABLE F($s = 5$) (Continued)

n= 40		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
3	5	52267	65005	89022	116313	158230	1791657	2746401	4092284	6758618	9761655
	10	14353	18326	25573	33598	45679	488933	745345	1106500	1821681	2627029
	15	6705	9392	13961	18852	26103	287748	438904	651796	1073364	1548075
	20	2482	5038	8689	12322	17556	201849	308173	457914	754424	1088310
	25	-1342	1987	5507	8539	12701	154006	235383	349984	576906	832430
	30	-5346	-851	3226	6010	9542	123517	189004	281223	463822	669433
	35	-9395	-3715	1328	4146	7305	102415	156908	233640	385568	556642
	40	-13397	-6544	-464	2657	5624	86968	133413	198809	328287	474079
4	5	38797	47882	64665	83256	110966	903601	1263483	1713832	2490623	3256290
	10	10568	13443	18568	24088	32134	245057	339666	457746	661074	861308
	15	4845	6813	10079	13472	18334	144441	200336	270085	390176	508433
	20	1725	3590	6227	8772	12310	101537	140994	190224	274981	358440
	25	-876	1370	3908	6054	8892	77656	107975	145801	210919	275038
	30	-3304	-560	2255	4239	6671	62442	86945	117510	170125	221931
	35	-5552	-2344	905	2903	5098	51915	72393	97934	141898	185185
	40	-7624	-3988	-307	1841	3917	44208	61740	83603	121233	158281
5	5	30983	38069	51002	65114	85784	589452	788712	1023405	1400937	1748747
	10	8393	10657	14638	18857	24891	159184	210606	270875	367486	456301
	15	3801	5361	7916	10524	14187	93910	124329	159969	217085	269586
	20	1322	2793	4867	6836	9515	66098	87621	112832	153231	190362
	25	-650	1046	3035	4704	6866	50622	67203	86623	117738	146334
	30	-2388	-417	1734	3282	5145	40765	54201	69934	95139	118303
	35	-3927	-1711	687	2237	3928	33943	45203	58385	79502	98906
	40	-5296	-2862	-229	1410	3013	28949	38615	49929	68051	84702
10	5	15595	18996	25051	31461	40528	207175	258509	313112	391295	455598
	10	4169	5279	7179	9127	11811	55386	67871	80948	99431	114488
	15	1837	2612	3849	5069	6716	32734	40134	47876	58808	67706
	20	610	1327	2341	3274	4494	23098	28361	33864	41631	47952
	25	-284	479	1439	2238	3234	17739	21817	26079	32094	36988
	30	-998	-183	806	1549	2417	14325	17650	21123	26023	30009
	35	-1586	-727	311	1045	1839	11963	14765	17693	21821	25179
	40	-2079	-1184	-101	650	1406	10232	12653	15179	18742	21639
15	5	10453	12696	16655	20802	26600	124420	152346	181211	221221	253092
	10	2779	3517	4769	6039	7764	33128	39717	46381	55441	62553
	15	1212	1729	2549	3348	4412	19591	23498	27442	32795	36992
	20	396	871	1544	2158	2949	13836	16620	19428	23237	26222
	25	-182	310	944	1471	2120	10636	12798	14977	17933	20248
	30	-631	-117	525	1015	1583	8597	10364	12143	14556	16446
	35	-993	-462	201	683	1203	7186	8679	10182	12219	13814
	40	-1291	-746	-65	422	918	6153	7444	8745	10506	11885
20	5	7866	9540	12482	15547	19806	88748	107725	127082	153511	174253
	10	2085	2639	3573	4515	5786	23578	27976	32347	38178	42672
	15	905	1293	1906	2500	3286	13948	16555	19141	22583	25232
	20	294	648	1152	1610	2195	9855	11715	13557	16009	17893
	25	-133	230	703	1096	1578	7579	9025	10457	12361	13824
	30	-461	-86	390	755	1177	6129	7312	8483	10039	11234
	35	-722	-338	149	507	894	5126	6126	7116	8431	9442
	40	-936	-544	-48	313	682	4391	5258	6115	7253	8128

TABLE F($s = 5$) (Continued)

n= 40		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
25	5	6307	7642	9983	12414	15780	68936	83258	97757	117382	132653
	10	1669	2112	2857	3605	4612	18289	21569	24796	29051	32295
	15	722	1033	1522	1995	2619	10821	12766	14674	17184	19094
	20	233	516	919	1284	1749	7648	9036	10396	12184	13544
	25	-106	182	560	874	1256	5883	6963	8021	9411	10467
	30	-363	-68	310	601	937	4759	5643	6509	7645	8509
	35	-568	-267	118	403	711	3981	4730	5462	6423	7153
	40	-734	-428	-38	248	542	3411	4060	4695	5527	6160
30	5	5264	6375	8319	10333	13115	56342	67828	79398	94971	107021
	10	1391	1760	2380	3001	3835	14933	17542	20090	23425	25950
	15	600	860	1267	1660	2177	8837	10383	11889	13856	15341
	20	193	429	764	1068	1453	6247	7350	8425	9826	10884
	25	-87	151	465	726	1044	4806	5666	6501	7591	8413
	30	-300	-56	257	499	778	3889	4593	5277	6168	6840
	35	-467	-220	98	334	591	3254	3850	4429	5183	5752
	40	-604	-353	-31	206	450	2788	3306	3808	4461	4954
35	5	4517	5468	7130	8850	11220	47634	57214	66831	79726	89664
	10	1193	1509	2040	2571	3282	12616	14779	16880	19617	21677
	15	514	736	1086	1422	1863	7466	8748	9990	11603	12814
	20	165	367	654	914	1243	5279	6194	7080	8229	9092
	25	-74	129	398	621	893	4062	4775	5464	6358	7029
	30	-255	-48	220	427	666	3287	3871	4436	5167	5716
	35	-397	-188	83	286	505	2751	3245	3724	4343	4807
	40	-513	-301	-27	176	385	2358	2787	3202	3739	4141
40	5	3956	4788	6239	7739	9804	41254	49469	57694	68689	77139
	10	1044	1321	1785	2248	2868	10921	12766	14553	16869	18607
	15	449	644	949	1243	1628	6463	7557	8613	9978	10999
	20	144	320	572	799	1086	4570	5351	6104	7077	7804
	25	-65	113	347	543	780	3517	4125	4712	5469	6034
	30	-222	-42	192	373	581	2846	3345	3825	4445	4908
	35	-346	-163	73	250	441	2382	2805	3212	3736	4128
	40	-446	-262	-23	154	336	2042	2409	2762	3217	3556

TABLE F($s = 5$) (Continued)

n= 50		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
3	5	66002	81941	112006	146178	198668	2243995	3439463	5124686	8463285	12223478
	10	18898	23801	32828	42875	58036	615540	938086	1392392	2292037	3305107
	15	9804	12932	18489	24562	33644	363963	554880	823772	1356234	1955820
	20	5343	7902	12100	16523	23035	256486	391295	581157	957117	1380469
	25	2162	4749	8360	11922	17036	196568	300126	445969	734759	1059951
	30	-888	2316	5815	8895	13152	158337	241965	359736	592935	855527
	35	-4069	52	3887	6718	10416	131835	201653	299971	494648	713861
	40	-7304	-2236	2282	5047	8374	112401	172094	256150	422583	609990
4	5	49030	60392	81394	104663	139350	1131549	1582019	2145725	3118037	4076424
	10	13973	17508	23875	30771	40851	308336	427216	575589	831082	1082688
	15	7163	9440	13391	17585	23653	182504	252965	340892	492282	641361
	20	3829	5708	8719	11796	16172	128811	178696	240940	348105	453632
	25	1496	3377	5988	8485	11945	98895	137332	185287	267849	349147
	30	-584	1605	4133	6310	9209	79814	110954	149803	216684	282538
	35	-2556	34	2732	4747	7285	66591	92677	125217	181234	236390
	40	-4414	-1440	1578	3549	5849	56895	79276	107191	155243	202555
5	5	39177	48035	64212	81871	107739	738076	987435	1281133	1753577	2188827
	10	11128	13904	18842	24105	31655	200216	264780	340452	461756	573272
	15	5660	7460	10539	13753	18314	118581	156875	201743	273652	339749
	20	2989	4480	6840	9208	12511	83772	110930	142746	193731	240592
	25	1143	2624	4678	6611	9232	64384	85351	109911	149266	185436
	30	-435	1228	3212	4905	7112	52020	69042	88980	120924	150282
	35	-1861	26	2109	3680	5621	43452	57743	74477	101288	125928
	40	-3155	-1062	1207	2742	4509	37170	49457	63844	86892	108072
10	5	19744	23991	31559	39573	50914	259357	323563	391856	489640	570064
	10	5561	6917	9263	11686	15033	69608	85253	101641	124804	143674
	15	2779	3668	5149	6643	8682	41277	50562	60278	73997	85165
	20	1428	2169	3317	4429	5919	29216	35827	42741	52500	60444
	25	525	1244	2248	3165	4359	22502	27629	32990	40555	46712
	30	-191	565	1526	2336	3351	18222	22404	26776	32945	37964
	35	-788	12	987	1742	2643	15255	18784	22470	27672	31903
	40	-1296	-459	554	1289	2115	13080	16129	19313	23805	27458
15	5	13241	16040	20987	26170	33419	155746	190668	226763	276794	316648
	10	3717	4616	6160	7736	9886	41623	49874	58218	69563	78468
	15	1844	2438	3416	4392	5706	24692	29588	34531	41241	46501
	20	939	1433	2194	2923	3887	17489	20979	24501	29279	33024
	25	341	815	1482	2085	2860	13480	16192	18927	22636	25543
	30	-122	367	1002	1536	2197	10924	13140	15375	18404	20778
	35	-500	7	645	1143	1731	9152	11026	12913	15473	17477
	40	-815	-292	360	843	1384	7853	9475	11108	13322	15056
20	5	9966	12056	15730	19561	24885	111090	134818	159021	192065	218000
	10	2792	3466	4617	5785	7369	29620	35124	40595	47893	53518
	15	1381	1826	2557	3282	4252	17575	20840	24079	28390	31708
	20	700	1070	1640	2183	2895	12452	14782	17091	20163	22525
	25	252	607	1106	1555	2129	9601	11413	13208	15594	17429
	30	-90	272	746	1144	1635	7784	9266	10733	12684	14184
	35	-366	5	479	850	1288	6524	7778	9019	10668	11936
	40	-594	-215	266	626	1029	5600	6687	7762	9190	10287

TABLE F($s = 5$) (Continued)

n= 50		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
25	5	7992	9659	12582	15620	19827	86287	104195	122322	146859	165952
	10	2237	2775	3693	4621	5874	22973	27078	31115	36440	40499
	15	1103	1460	2044	2620	3389	13633	16067	18456	21598	23990
	20	557	854	1309	1742	2307	9661	11399	13102	15342	17045
	25	200	483	882	1240	1696	7451	8803	10128	11869	13192
	30	-71	216	594	912	1302	6042	7149	8232	9657	10739
	35	-289	4	381	677	1025	5065	6002	6919	8124	9039
	40	-468	-170	211	499	819	4349	5161	5956	7000	7792
30	5	6671	8058	10485	13002	16478	70522	84882	99347	118617	133883
	10	1865	2314	3077	3847	4884	18757	22021	25208	29381	32539
	15	919	1216	1702	2181	2817	11132	13067	14952	17413	19272
	20	463	711	1090	1449	1917	7890	9272	10616	12370	13694
	25	166	401	733	1032	1410	6086	7161	8207	9572	10601
	30	-59	179	494	758	1062	4936	5816	6673	7789	8631
	35	-238	4	316	563	852	4139	4884	5609	6554	7266
	40	-385	-140	175	414	680	3554	4201	4829	5648	6265
35	5	5725	6912	8987	11136	14098	59622	71599	83623	99743	112168
	10	1600	1985	2638	3296	4180	15846	18551	21180	24603	27180
	15	787	1042	1458	1868	2411	9405	11008	12562	14580	16096
	20	396	608	933	1241	1641	6667	7812	8920	10359	11439
	25	142	343	628	883	1206	5143	6034	6897	8016	8855
	30	-50	153	422	649	925	4171	4902	5608	6524	7211
	35	-203	3	270	481	728	3498	4117	4715	5490	6071
	40	-328	-119	150	354	582	3004	3541	4060	4732	5235
40	5	5015	6052	7864	9738	12319	51637	61906	72189	85935	96499
	10	1401	1737	2308	2882	3653	13716	16024	18259	21156	23330
	15	689	912	1276	1633	2107	8141	9509	10830	12537	13815
	20	346	532	816	1085	1434	5771	6748	7691	8908	9818
	25	124	300	549	772	1054	4453	5213	5947	6894	7601
	30	-44	133	369	567	809	3612	4235	4836	5611	6190
	35	-177	3	236	421	636	3029	3557	4066	4722	5212
	40	-285	-104	131	309	508	2602	3060	3501	4070	4495
45	5	4461	5382	6991	8653	10939	45536	54522	63502	75479	84664
	10	1246	1545	2052	2561	3245	12091	14102	16044	18554	20432
	15	612	810	1134	1451	1871	7177	8368	9516	10995	12098
	20	307	472	725	964	1273	5088	5939	6758	7812	8598
	25	110	266	487	686	938	3925	4589	5226	6046	6657
	30	-39	118	328	503	718	3184	3728	4250	4922	5422
	35	-156	2	209	373	565	2671	3131	3574	4142	4566
	40	-252	-92	116	274	451	2294	2694	3078	3571	3938
50	5	4017	4846	6292	7785	9836	40724	48710	56679	67289	75410
	10	1121	1391	1847	2305	2918	10809	12591	14307	16521	18172
	15	551	729	1020	1305	1683	6416	7472	8486	9789	10759
	20	276	425	652	867	1145	4549	5303	6027	6956	7647
	25	99	239	438	617	841	3510	4097	4661	5384	5921
	30	-35	106	294	453	645	2847	3329	3791	4383	4823
	35	-140	2	188	336	508	2388	2796	3188	3689	4061
	40	-226	-83	104	247	406	2052	2406	2745	3180	3503

TABLE F($s = 5$) (Continued)

n= 60		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
3	5	79721	98864	134982	176037	239101	2696337	4132535	6157103	10167977	14685337
	10	23365	29220	40047	52126	70374	742167	1130860	1678337	2762487	3983322
	15	12704	16349	22948	30226	41155	440218	670918	995844	1639267	2363803
	20	7723	10534	15403	20658	28475	311181	474510	704541	1160047	1672974
	25	4529	7044	11051	15219	21325	239209	364993	542142	892925	1287927
	30	1952	4563	8152	11669	16708	193257	295081	438481	722435	1042181
	35	-586	2538	6029	9144	13467	161376	246584	366581	604187	871741
	40	-3221	651	4355	7233	11056	137975	210989	313809	517402	746654
4	5	59252	72894	98115	126065	167730	1359500	1900560	2577626	3745462	4896572
	10	17317	21530	29155	37436	49555	371628	514786	693461	1001133	1304125
	15	9336	11979	16653	21666	28952	220592	305629	411746	594458	774381
	20	5606	7661	11134	14774	20009	156119	216446	291722	421327	548950
	25	3225	5073	7953	10857	14967	120178	166750	224858	324901	423413
	30	1346	3240	5836	8304	11714	97239	135037	182196	263386	343331
	35	-387	1764	4288	6488	9431	81329	113045	152614	220732	287805
	40	-2046	439	3072	5116	7735	69653	96907	130906	189433	247062
5	5	47360	57994	77418	98623	129691	886702	1186162	1538886	2106225	2628915
	10	13813	17118	23024	29339	38410	241258	318968	410048	556052	690275
	15	7405	9488	13124	16959	22427	143268	189443	243547	330259	409964
	20	4410	6038	8752	11547	15487	101469	134271	172700	234285	290890
	25	2507	3973	6233	8472	11576	78174	103538	133249	180860	224620
	30	1027	2516	4558	6468	9053	63309	83930	108083	146786	182357
	35	-289	1352	3335	5044	7284	53000	70334	90635	123162	153056
	40	-1498	331	2376	3969	5970	45435	60357	77831	105827	131556
10	5	23887	28982	38064	47684	61298	311539	388618	470601	587987	684532
	10	6929	8537	11338	14237	18252	83834	102641	122340	150184	172867
	15	3666	4691	6431	8206	10642	49826	60999	72689	89197	102636
	20	2145	2953	4264	5568	7337	35343	43303	51630	63384	72950
	25	1188	1915	3016	4071	5474	27276	33454	39914	49033	56453
	30	470	1190	2189	3096	4274	22129	27172	32444	39884	45938
	35	-127	624	1588	2404	3433	18561	22817	27265	33542	38649
	40	-640	149	1117	1882	2808	15942	19620	23465	28889	33301
15	5	16024	19382	25317	31538	40238	187074	228990	272316	332368	380204
	10	4637	5704	7544	9429	12005	50120	60033	70058	83689	94388
	15	2442	3124	4271	5428	6996	29797	35682	41624	49691	56016
	20	1419	1958	2826	3679	4820	21147	25345	29581	35329	39833
	25	779	1263	1994	2686	3594	16330	19592	22884	27348	30846
	30	305	780	1442	2039	2804	13257	15924	18614	22262	25120
	35	-82	406	1042	1581	2251	11126	13381	15654	18736	21150
	40	-407	96	731	1236	1840	9562	11514	13482	16149	18238
20	5	12064	14569	18977	23574	29964	133431	161910	190960	230621	261748
	10	3487	4285	5656	7053	8949	35663	42275	48846	57611	64367
	15	1831	2342	3199	4058	5214	21205	25128	29020	34201	38187
	20	1060	1465	2114	2748	3591	15053	17853	20629	24321	27161
	25	580	943	1489	2005	2677	11628	13806	15964	18834	21040
	30	225	580	1076	1521	2088	9443	11225	12989	15336	17140
	35	-60	301	776	1178	1675	7928	9435	10928	12912	14437
	40	-298	71	543	920	1369	6816	8122	9415	11133	12454

TABLE F($s = 5$) (Continued)

n= 60		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
25	5	9675	11673	15180	18825	23873	103639	125132	146888	176336	199251
	10	2794	3432	4525	5634	7135	27659	32588	37436	43830	48705
	15	1465	1874	2558	3241	4156	16447	19371	22240	26016	28889
	20	846	1170	1689	2194	2862	11678	13765	15812	18503	20550
	25	461	752	1189	1600	2133	9022	10646	12238	14331	15922
	30	179	462	858	1213	1663	7328	8658	9960	11672	12974
	35	-48	239	618	939	1334	6153	7279	8381	9830	10930
	40	-235	56	432	733	1090	5291	6267	7222	8477	9430
30	5	8077	9739	12650	15670	19842	84703	101937	119298	142664	160745
	10	2331	2862	3771	4691	5933	22582	26500	30328	35338	39130
	15	1221	1562	2131	2698	3455	13429	15752	18017	20973	23206
	20	704	974	1406	1826	2379	9536	11195	12810	14918	16508
	25	383	625	989	1331	1773	7368	8660	9917	11556	12792
	30	148	383	714	1009	1382	5985	7043	8072	9413	10425
	35	-39	198	514	781	1108	5027	5922	6793	7928	8784
	40	-194	46	359	609	906	4323	5100	5855	6838	7580
35	5	6932	8355	10844	13421	16976	71610	85985	100415	119761	134672
	10	2000	2455	3233	4019	5077	19077	22324	25480	29590	32684
	15	1046	1339	1826	2311	2957	11345	13270	15136	17560	19380
	20	603	835	1205	1563	2036	8057	9432	10763	12491	13788
	25	328	535	847	1139	1517	6226	7296	8333	9677	10685
	30	127	328	611	863	1182	5058	5935	6783	7883	8709
	35	-34	169	439	668	948	4248	4991	5709	6640	7339
	40	-166	40	307	521	775	3654	4298	4921	5728	6333
40	5	6072	7315	9489	11737	14833	62019	74344	86684	103181	115859
	10	1751	2149	2829	3515	4438	16513	19283	21965	25444	28054
	15	916	1172	1597	2021	2584	9820	11462	13048	15098	16633
	20	527	730	1054	1367	1779	6974	8147	9279	10740	11833
	25	286	468	741	996	1325	5390	6303	7184	8321	9171
	30	110	286	534	755	1033	4379	5127	5849	6780	7475
	35	-29	148	384	584	828	3678	4312	4923	5711	6300
	40	-144	34	268	455	677	3164	3714	4244	4927	5437
45	5	5401	6506	8435	10429	13171	54692	65476	76252	90626	101648
	10	1558	1911	2515	3124	3941	14555	16969	19301	22314	24568
	15	814	1042	1420	1795	2295	8656	10087	11465	13240	14565
	20	468	649	936	1214	1580	6148	7170	8153	9419	10363
	25	254	416	658	885	1177	4751	5548	6313	7298	8032
	30	98	254	474	670	917	3861	4513	5140	5946	6547
	35	-26	131	341	518	736	3243	3796	4327	5009	5518
	40	-128	31	238	404	601	2790	3269	3730	4322	4763
50	5	4864	5858	7592	9383	11844	48912	58496	68059	80792	90538
	10	1402	1721	2264	2811	3545	13012	15151	17211	19868	21851
	15	733	937	1278	1615	2064	7739	9006	10224	11789	12953
	20	421	584	842	1093	1421	5497	6402	7271	8386	9216
	25	228	374	592	796	1058	4248	4953	5630	6498	7143
	30	88	229	426	603	825	3452	4030	4584	5295	5823
	35	-23	118	306	466	661	2900	3389	3859	4461	4908
	40	-115	27	214	363	540	2494	2919	3327	3849	4236

TABLE F($s = 5$) (Continued)

n= 60		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
55	5	4425	5327	6902	8528	10760	44237	52860	61454	72881	81614
	10	1275	1565	2058	2555	3221	11765	13684	15530	17905	19673
	15	666	852	1162	1468	1875	6997	8134	9225	10623	11662
	20	383	531	766	993	1291	4970	5782	6560	7557	8297
	25	208	340	538	723	961	3841	4474	5080	5856	6431
	30	80	208	387	548	749	3121	3640	4136	4772	5243
	35	-21	107	278	424	601	2622	3062	3482	4020	4419
	40	-104	25	194	330	491	2256	2637	3002	3469	3815
60	5	4058	4885	6328	7815	9858	40376	48214	56017	66379	74290
	10	1169	1435	1887	2341	2951	10735	12476	14147	16293	17890
	15	611	781	1065	1345	1718	6385	7416	8403	9667	10604
	20	351	486	702	910	1183	4535	5272	5976	6877	7545
	25	190	311	493	663	881	3505	4079	4628	5328	5848
	30	73	190	355	502	686	2849	3319	3768	4343	4768
	35	-19	98	255	388	550	2393	2792	3172	3659	4019
	40	-95	23	178	302	449	2059	2405	2735	3157	3469

TABLE F($s = 5$) (Continued)

n= 80		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
3	5	107138	132694	180920	235743	319959	3601030	5518691	8221959	13577399	19609110
	10	32194	39981	54434	70591	95023	995449	1516460	2250307	3703521	5339952
	15	18268	23025	31769	41486	56131	592779	903082	1340126	2205571	3180118
	20	12010	15522	21858	28832	39293	420650	641070	951513	1566253	2258488
	25	8286	11175	16219	21685	29827	324601	494904	734759	1209716	1744545
	30	5671	8254	12534	17060	23735	263237	401538	596315	982008	1416320
	35	3583	6085	9902	13802	19474	220633	336720	500210	823947	1188490
	40	1693	4337	7902	11367	16317	189329	289099	429607	707831	1021125
4	5	79677	97882	131548	168860	224485	1815408	2537651	3441439	5000331	6536891
	10	23925	29516	39676	50738	66945	498232	689956	929246	1341299	1747082
	15	13504	16937	23107	29781	39521	296801	411007	553526	798917	1040563
	20	8816	11365	15857	20664	27642	210786	292020	393387	567917	739780
	25	6027	8137	11732	15515	20963	162810	225679	304126	439190	572189
	30	4074	5970	9037	12183	16667	132169	183317	247136	357012	465207
	35	2527	4363	7114	9838	13663	110900	153915	207585	299985	390971
	40	1162	3075	5653	8086	11438	95276	132319	178535	258101	336447
5	5	63712	77899	103820	132123	173591	1183960	1583621	2054339	2811530	3509104
	10	19118	23498	31359	39785	51905	323356	427364	549267	744681	924327
	15	10753	13451	18238	23332	30629	192667	254615	327201	443535	550470
	20	6987	8998	12494	16172	21411	136898	181000	232671	315478	391591
	25	4749	6419	9226	12128	16228	105800	139971	180002	244154	303118
	30	3184	4689	7091	9513	12895	85942	113776	146383	198633	246657
	35	1953	3408	5569	7672	10565	72160	95598	123054	167048	207483
	40	885	2384	4414	6298	8840	62036	82247	105920	143852	178715
10	5	32166	38959	51070	63902	82064	415907	518730	628094	784684	913470
	10	9631	11754	15470	19330	24683	112293	137423	163747	200954	231265
	15	5372	6690	8968	11314	14552	66934	81882	97525	119614	137597
	20	3454	4444	6119	7824	10160	47609	58271	69425	85171	97988
	25	2316	3144	4499	5852	7690	36839	45122	53785	66013	75966
	30	1526	2274	3441	4578	6103	29963	36730	43806	53793	61921
	35	915	1633	2688	3681	4993	25192	30907	36883	45317	52179
	40	403	1125	2117	3013	4173	21687	26631	31799	39092	45026
15	5	21586	26061	33973	42270	53874	249729	305637	363423	443517	507319
	10	6456	7862	10301	12808	16240	67118	80356	93743	111945	126233
	15	3590	4465	5964	7491	9571	40012	47877	55820	66602	75056
	20	2299	2958	4063	5175	6679	28470	34084	39750	47439	53464
	25	1534	2086	2982	3867	5053	22039	26405	30810	36786	41468
	30	1004	1503	2277	3022	4008	17934	21505	25108	29992	33820
	35	598	1075	1775	2427	3278	15085	18105	21150	25280	28516
	40	261	737	1395	1984	2738	12993	15608	18244	21820	24621
20	5	16254	19593	25469	31598	40119	178115	216097	254838	307732	349244
	10	4859	5910	7726	9582	12108	47753	56578	65350	77051	86070
	15	2697	3352	4470	5602	7134	28469	33709	38907	45828	51153
	20	1723	2218	3043	3868	4977	20260	24002	27711	32646	36442
	25	1147	1562	2232	2889	3765	15687	18598	21483	25321	28272
	30	749	1123	1702	2256	2985	12768	15151	17511	20650	23064
	35	444	801	1325	1812	2441	10743	12759	14755	17411	19452
	40	193	548	1040	1480	2038	9255	11002	12732	15032	16800

TABLE F($s = 5$) (Continued)

n= 80		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
25	5	13038	15700	20374	25234	31965	138343	167006	196020	235291	265849
	10	3895	4735	6183	7656	9654	37032	43610	50080	58614	65120
	15	2160	2684	3575	4475	5688	22078	25982	29813	34854	38691
	20	1378	1774	2433	3089	3967	15714	18502	21236	24831	27565
	25	916	1248	1783	2306	3000	12169	14339	16466	19262	21388
	30	597	896	1359	1801	2379	9906	11682	13423	15712	17451
	35	353	639	1058	1445	1945	8336	9839	11313	13249	14721
	40	153	436	830	1180	1623	7182	8486	9763	11441	12716
30	5	10885	13099	16980	21005	26568	113065	136048	159199	190359	214470
	10	3251	3951	5153	6376	8028	30234	35462	40569	47254	52315
	15	1801	2238	2979	3726	4729	18025	21127	24149	28095	31076
	20	1149	1479	2027	2571	3299	12831	15046	17202	20017	22141
	25	762	1039	1485	1919	2494	9937	11661	13340	15529	17181
	30	496	746	1131	1498	1977	8090	9502	10876	12668	14020
	35	293	531	880	1202	1616	6808	8004	9167	10684	11827
	40	127	362	690	981	1349	5867	6903	7912	9226	10218
35	5	9343	11238	14555	17991	22731	95587	114756	133998	159797	179681
	10	2790	3389	4418	5462	6871	25540	29872	34083	39566	43695
	15	1545	1919	2554	3192	4048	15227	17796	20287	23521	25951
	20	984	1267	1737	2202	2823	10839	12674	14452	16758	18490
	25	653	890	1272	1644	2134	8395	9824	11208	13002	14349
	30	424	639	969	1283	1692	6835	8006	9138	10607	11709
	35	250	454	753	1029	1383	5753	6744	7703	8946	9879
	40	108	310	590	840	1154	4958	5817	6649	7727	8536
40	5	8183	9840	12737	15734	19862	82784	99219	115675	137673	154579
	10	2444	2968	3867	4778	6005	22106	25801	29380	34021	37503
	15	1353	1680	2235	2791	3538	13180	15371	17487	20223	22271
	20	861	1109	1519	1926	2467	9383	10948	12458	14409	15868
	25	571	779	1113	1437	1865	7267	8486	9662	11180	12314
	30	371	558	847	1122	1478	5917	6915	7878	9121	10050
	35	219	397	659	900	1208	4980	5826	6641	7693	8480
	40	94	270	516	734	1008	4292	5026	5733	6645	7327
45	5	7280	8752	11323	13980	17637	73004	87383	101753	120921	135619
	10	2174	2639	3438	4246	5334	19485	22706	25815	29836	32842
	15	1203	1494	1986	2481	3142	11617	13528	15365	17734	19501
	20	766	986	1350	1711	2191	8271	9634	10946	12635	13895
	25	507	692	989	1277	1656	6406	7468	8489	9804	10784
	30	329	496	753	996	1313	5216	6086	6923	7999	8801
	35	194	352	585	799	1073	4390	5128	5836	6747	7426
	40	84	240	458	652	895	3784	4424	5038	5828	6417
50	5	6557	7880	10191	12578	15860	65288	78068	90820	107798	120795
	10	1957	2376	3094	3821	4797	17419	20272	23021	26565	29209
	15	1083	1345	1788	2232	2826	10386	12077	13701	15789	17342
	20	689	887	1215	1540	1970	7394	8602	9761	11250	12357
	25	456	623	890	1149	1490	5727	6668	7570	8729	9590
	30	296	446	677	896	1181	4664	5434	6174	7122	7827
	35	174	317	526	719	965	3926	4579	5205	6008	6605
	40	75	216	412	587	805	3383	3950	4493	5190	5707

TABLE F($s = 5$) (Continued)

n= 80		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
55	5	5964	7167	9266	11432	14409	59047	70546	82006	97242	108888
	10	1780	2161	2813	3473	4359	15749	18309	20771	23939	26298
	15	985	1223	1625	2029	2567	9390	10907	12361	14227	15613
	20	626	807	1105	1399	1790	6685	7769	8807	10137	11124
	25	415	566	809	1044	1353	5178	6023	6831	7866	8634
	30	269	406	616	814	1073	4217	4909	5571	6418	7047
	35	158	288	478	653	876	3550	4136	4696	5414	5947
	40	68	196	375	533	731	3059	3568	4054	4677	5139
60	5	5470	6572	8494	10477	13201	53894	64346	74751	88568	99116
	10	1633	1982	2579	3183	3994	14371	16692	18921	21784	23913
	15	903	1121	1490	1859	2352	8568	9944	11260	12946	14196
	20	574	739	1013	1282	1640	6100	7083	8023	9225	10115
	25	380	519	741	957	1240	4726	5491	6223	7158	7851
	30	246	372	564	746	983	3848	4475	5075	5841	6408
	35	145	264	438	598	803	3239	3771	4278	4927	5407
	40	63	179	343	488	670	2792	3253	3694	4256	4673
65	5	5051	6068	7841	9670	12180	49569	59147	68674	81313	90952
	10	1508	1830	2381	2938	3685	13215	15338	17374	19985	21924
	15	834	1035	1375	1716	2171	7879	9137	10339	11877	13015
	20	530	683	935	1184	1513	5610	6508	7366	8462	9273
	25	351	479	684	883	1144	4345	5046	5714	6567	7197
	30	227	343	521	689	907	3539	4112	4660	5358	5875
	35	134	243	404	552	741	2979	3465	3929	4520	4958
	40	58	166	317	451	618	2568	2989	3392	3905	4284
70	5	4692	5636	7281	8978	11305	45885	54725	63510	75155	84029
	10	1400	1699	2211	2728	3421	12230	14186	16060	18460	20240
	15	774	961	1277	1593	2015	7292	8451	9557	10970	12015
	20	492	634	868	1099	1405	5192	6020	6809	7817	8561
	25	326	445	635	820	1062	4022	4667	5282	6066	6644
	30	211	318	483	639	842	3275	3804	4307	4950	5424
	35	124	226	375	513	688	2757	3205	3632	4176	4577
	40	54	154	294	418	574	2377	2765	3136	3607	3955
75	5	4380	5261	6796	8378	10548	42711	50917	59068	69864	78085
	10	1307	1586	2064	2548	3192	11382	13196	14931	17151	18796
	15	723	897	1192	1487	1880	6787	7861	8885	10192	11157
	20	459	592	810	1026	1311	4832	5599	6330	7262	7950
	25	304	415	593	765	991	3743	4341	4910	5635	6170
	30	197	297	451	597	785	3048	3538	4005	4599	5037
	35	116	211	350	478	642	2566	2981	3377	3880	4250
	40	50	143	274	390	535	2212	2572	2915	3352	3673
80	5	4108	4933	6372	7854	9886	39948	47605	55207	65269	72926
	10	1226	1488	1935	2386	2992	10644	12334	13950	16015	17544
	15	678	841	1118	1394	1762	6347	7348	8301	9517	10413
	20	431	555	759	961	1229	4519	5234	5914	6781	7420
	25	285	389	556	717	929	3501	4058	4588	5262	5759
	30	185	278	423	559	736	2851	3307	3742	4294	4701
	35	108	198	328	448	601	2400	2787	3155	3623	3967
	40	47	134	257	366	502	2069	2405	2724	3130	3429

TABLE F($s = 5$) (Continued)

n= 100		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
3	5	134540	166512	226850	295443	400812	4505727	6904855	10286829	16986845	24532920
	10	40961	50695	68788	89031	119654	1248749	1902091	2822329	4644645	6696714
	15	23697	29607	40529	52703	71076	745373	1135303	1684499	2772029	3996660
	20	16055	20354	28221	36942	50069	530168	807714	1198616	1972683	2844331
	25	11625	15066	21260	28068	38276	410060	624929	927551	1526802	2201595
	30	8645	11586	16746	22348	30700	333307	508138	754369	1241952	1790998
	35	6422	9075	13556	18337	25411	279998	427030	634106	1044153	1505888
	40	4620	7137	11163	15356	21502	240813	367416	545717	898781	1296351
4	5	100090	122862	164975	211651	281237	2271320	3174748	4305260	6255211	8177226
	10	30484	37465	50174	64022	84323	624850	865147	1165061	1681506	2190095
	15	17570	21824	29517	37864	50068	373034	516419	695354	1003446	1306837
	20	11847	14954	20513	26509	35246	265485	367641	495119	714606	930739
	25	8528	11027	15420	20114	26924	205484	284670	383480	553605	721130
	30	6296	8442	12117	15993	21580	167152	231672	312180	450790	587281
	35	4634	6579	9784	13103	17849	140534	194875	262678	379415	494365
	40	3293	5142	8035	10957	15092	120971	167833	226303	326969	426093
5	5	80054	97796	130217	165619	217488	1481220	1981084	2569816	3516841	4389301
	10	24383	29847	39673	50217	65391	405465	535773	688504	933335	1158412
	15	14018	17356	23316	29681	38816	242082	319809	410885	556854	691028
	20	9422	11867	16183	20763	27314	172349	227761	292683	396728	492363
	25	6756	8728	12148	15741	20855	133456	176444	226809	307519	381705
	30	4964	6663	9531	12504	16707	108611	143672	184745	250565	311063
	35	3632	5175	7683	10235	13812	91361	120919	155546	211032	262031
	40	2561	4028	6298	8550	11673	78685	104201	134091	181987	226008
10	5	40439	48931	64074	80119	102829	520276	648843	785589	981382	1142411
	10	12311	14955	19593	24417	31109	140755	172210	205160	251731	289671
	15	7036	8660	11487	14411	18455	84048	102774	122370	150042	172571
	20	4694	5892	7950	10063	12973	59883	73250	87233	106974	123043
	25	3337	4308	5948	7614	9895	46412	56803	67671	83013	95499
	30	2426	3267	4650	6035	7919	37810	46303	55186	67724	77927
	35	1752	2518	3735	4930	6540	31838	39016	46521	57115	65735
	40	1215	1943	3049	4109	5521	27450	33661	40156	49321	56779
15	5	27144	32737	42629	53001	67509	312385	382284	454531	554667	634434
	10	8260	10010	13052	16182	20471	84119	100682	117432	140206	158082
	15	4710	5787	7645	9546	12141	50231	60077	70020	83519	94102
	20	3134	3929	5285	6661	8532	35798	42830	49926	59557	67104
	25	2220	2867	3949	5036	6505	27755	33225	38744	46233	52101
	30	1607	2169	3083	3989	5203	22618	27094	31609	37734	42533
	35	1155	1667	2473	3255	4296	19053	22839	26657	31837	35895
	40	797	1282	2015	2711	3625	16433	19712	23019	27505	31019
20	5	20442	24614	31960	39622	50275	222799	270284	318717	384844	436741
	10	6219	7527	9792	12109	15264	59844	70884	81856	96493	107775
	15	3542	4348	5732	7141	9052	35735	42293	48798	57459	64124
	20	2353	2949	3960	4981	6359	25471	30155	34798	40976	45729
	25	1664	2149	2957	3764	4848	19751	23396	27009	31815	35511
	30	1202	1624	2307	2980	3877	16099	19083	22039	25972	28995
	35	862	1246	1849	2431	3200	13564	16089	18591	21918	24476
	40	593	957	1506	2024	2700	11701	13889	16057	18940	21156

TABLE F($s = 5$) (Continued)

n= 100		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
25	5	16398	19725	25567	31642	40057	173048	208880	245152	294247	332448
	10	4988	6033	7836	9676	12171	46407	54634	62726	73400	81537
	15	2838	3483	4586	5705	7217	27712	32595	37388	43696	48496
	20	1884	2361	3167	3978	5070	19754	23242	26663	31163	34585
	25	1331	1719	2364	3006	3864	15320	18035	20698	24198	26860
	30	960	1298	1844	2379	3090	12488	14712	16891	19756	21934
	35	687	995	1477	1940	2550	10523	12405	14250	16675	18518
	40	472	763	1202	1615	2151	9079	10711	12310	14411	16009
30	5	13691	16458	21308	26340	33294	141427	170159	199100	238053	268195
	10	4164	5034	6533	8058	10121	37886	44424	50812	59172	65501
	15	2368	2905	3822	4750	6001	22623	26503	30283	35220	38949
	20	1571	1968	2639	3312	4215	16128	18899	21597	25119	27777
	25	1109	1433	1969	2502	3213	12508	14666	16766	19506	21573
	30	799	1081	1535	1980	2569	10197	11964	13684	15927	17619
	35	572	828	1229	1615	2120	8593	10089	11545	13444	14876
	40	392	635	1000	1343	1788	7414	8712	9974	11620	12861
35	5	11752	14120	18266	22561	28485	119564	143528	167583	199833	224690
	10	3574	4319	5601	6904	8663	32004	37421	42687	49543	54707
	15	2032	2492	3277	4070	5136	19111	22324	25439	29485	32524
	20	1347	1688	2262	2837	3608	13624	15920	18143	21029	23195
	25	950	1228	1687	2143	2749	10567	12355	14085	16331	18016
	30	685	926	1315	1696	2198	8615	10079	11497	13335	14714
	35	489	709	1053	1382	1814	7260	8500	9700	11257	12424
	40	335	543	857	1150	1530	6265	7340	8381	9730	10742
40	5	10294	12364	15984	19730	24891	103550	124094	144665	172165	193299
	10	3130	3782	4902	6039	7572	27700	32321	36796	42600	46953
	15	1779	2181	2867	3560	4489	16541	19281	21927	25350	27911
	20	1179	1477	1979	2481	3153	11793	13750	15639	18080	19905
	25	831	1074	1476	1874	2403	9147	10671	12142	14041	15461
	30	599	810	1151	1483	1921	7458	8706	9911	11466	12628
	35	428	620	921	1209	1585	6285	7343	8363	9679	10663
	40	293	475	749	1005	1337	5423	6341	7225	8367	9220
45	5	9158	10997	14210	17531	22102	91315	109291	127255	151216	169589
	10	2785	3364	4358	5367	6725	24416	28443	32331	37358	41118
	15	1582	1940	2549	3163	3987	14580	16967	19266	22229	24439
	20	1048	1313	1759	2205	2800	10395	12100	13741	15854	17429
	25	739	955	1312	1665	2134	8063	9391	10668	12313	13538
	30	532	720	1022	1317	1706	6574	7662	8708	10055	11058
	35	380	551	818	1074	1407	5540	6462	7348	8488	9338
	40	260	422	665	893	1187	4781	5581	6349	7338	8074
50	5	8248	9902	12790	15773	19876	81665	97640	113581	134805	151051
	10	2508	3029	3923	4829	6049	21827	25394	28830	33262	36568
	15	1425	1746	2294	2846	3586	13034	15148	17179	19790	21733
	20	944	1182	1583	1984	2519	9293	10803	12253	14115	15499
	25	665	860	1181	1498	1919	7208	8384	9513	10962	12039
	30	479	648	920	1185	1534	5877	6841	7766	8952	9834
	35	342	496	736	966	1266	4953	5770	6553	7558	8304
	40	234	379	599	803	1067	4275	4983	5662	6534	7181

TABLE F($s = 5$) (Continued)

n= 100		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
55	5	7503	9005	11628	14336	18057	73858	88233	102558	121604	136162
	10	2281	2755	3567	4390	5496	19734	22935	26013	29974	32923
	15	1296	1588	2086	2587	3258	11784	13681	15499	17833	19565
	20	858	1075	1439	1803	2288	8402	9757	11055	12718	13953
	25	605	782	1073	1362	1744	6517	7573	8583	9878	10838
	30	435	589	836	1077	1394	5314	6179	7007	8067	8853
	35	310	450	669	878	1150	4479	5212	5913	6811	7476
	40	212	345	544	730	970	3865	4501	5109	5888	6465
60	5	6881	8257	10660	13139	16543	67412	80478	93484	110756	123942
	10	2092	2526	3270	4023	5036	18007	20909	23696	27276	29938
	15	1188	1456	1912	2371	2985	10753	12473	14119	16227	17790
	20	787	985	1319	1653	2097	7667	8895	10070	11573	12687
	25	554	716	984	1248	1597	5947	6904	7819	8989	9855
	30	399	540	767	987	1277	4849	5633	6383	7341	8050
	35	284	413	613	804	1053	4087	4752	5386	6198	6798
	40	194	316	499	669	888	3527	4104	4654	5358	5879
65	5	6354	7624	9841	12126	15263	62001	73975	85884	101683	113732
	10	1932	2332	3019	3714	4647	16558	19213	21758	25023	27447
	15	1097	1344	1765	2189	2755	9887	11460	12964	14886	16309
	20	726	910	1218	1525	1935	7050	8173	9246	10617	11631
	25	512	661	908	1152	1474	5469	6344	7179	8246	9035
	30	368	498	707	911	1178	4459	5176	5861	6734	7380
	35	262	381	566	742	972	3758	4366	4946	5686	6233
	40	179	291	460	617	820	3244	3771	4274	4916	5390
70	5	5902	7082	9138	11258	14167	57394	68444	79426	93983	105076
	10	1795	2166	2804	3448	4313	15325	17770	20112	23113	25339
	15	1019	1249	1639	2032	2557	9151	10600	11983	13749	15055
	20	674	845	1131	1416	1796	6525	7560	8547	9806	10737
	25	475	614	843	1069	1368	5061	5868	6636	7617	8340
	30	342	463	657	846	1094	4127	4788	5418	6220	6813
	35	244	354	525	689	902	3479	4039	4572	5252	5754
	40	167	271	427	573	761	3002	3488	3951	4541	4976
75	5	5511	6611	8529	10506	13218	53424	63682	73871	87367	97643
	10	1675	2022	2617	3218	4025	14262	16529	18698	21474	23531
	15	951	1166	1530	1896	2386	8517	9859	11140	12774	13981
	20	630	789	1056	1322	1676	6072	7032	7946	9111	9970
	25	443	573	787	998	1277	4711	5458	6170	7076	7745
	30	319	432	613	789	1020	3841	4454	5037	5779	6327
	35	227	330	490	643	842	3238	3757	4251	4880	5343
	40	155	252	399	535	710	2794	3245	3673	4219	4621
80	5	5168	6199	7997	9849	12389	49968	59540	69042	81620	91191
	10	1571	1896	2454	3017	3772	13337	15450	17470	20052	21964
	15	892	1093	1435	1778	2236	7964	9216	10408	11928	13049
	20	590	739	990	1239	1571	5679	6573	7424	8507	9306
	25	416	537	738	935	1197	4405	5102	5764	6607	7229
	30	299	405	575	740	956	3592	4163	4706	5396	5905
	35	213	309	460	603	789	3028	3511	3971	4556	4987
	40	146	237	374	501	665	2613	3033	3432	3939	4313

TABLE F($s = 5$) (Continued)

n= 100		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
85	5	4865	5835	7527	9269	11657	46931	55903	64806	76583	85539
	10	1479	1785	2309	2839	3550	12525	14503	16392	18806	20592
	15	840	1029	1350	1673	2104	7479	8651	9766	11186	12233
	20	556	696	931	1166	1478	5333	6170	6966	7978	8724
	25	391	506	694	880	1126	4137	4789	5409	6197	6777
	30	281	381	541	696	900	3373	3908	4416	5061	5536
	35	200	291	433	567	742	2844	3296	3727	4273	4676
	40	137	223	352	472	626	2454	2847	3220	3695	4044
90	5	4595	5512	7109	8753	11007	44243	52685	61059	72130	80546
	10	1397	1686	2181	2681	3352	11806	13665	15440	17706	19381
	15	793	972	1275	1580	1987	7050	8151	9199	10532	11514
	20	525	657	880	1101	1395	5027	5813	6561	7511	8211
	25	369	478	656	831	1063	3900	4512	5095	5834	6378
	30	266	360	511	657	850	3180	3682	4159	4765	5211
	35	189	275	409	536	701	2680	3106	3510	4023	4401
	40	129	210	332	445	591	2313	2683	3033	3479	3806
95	5	4354	5223	6735	8292	10425	41845	49817	57721	68167	76104
	10	1324	1598	2067	2540	3175	11165	12919	14593	16727	18304
	15	751	921	1208	1497	1882	6667	7706	8694	9949	10874
	20	497	623	833	1043	1322	4754	5496	6201	7096	7755
	25	350	453	621	787	1007	3688	4266	4815	5512	6024
	30	252	341	484	623	805	3007	3481	3931	4502	4921
	35	179	260	387	507	664	2535	2936	3318	3801	4156
	40	122	199	314	422	560	2188	2536	2867	3286	3595
100	5	4138	4962	6398	7877	9902	39694	47246	54730	64617	72125
	10	1258	1518	1963	2413	3016	10590	12250	13833	15851	17341
	15	714	875	1148	1422	1788	6324	7307	8241	9428	10301
	20	472	592	792	991	1255	4509	5211	5878	6724	7346
	25	332	430	590	748	956	3498	4045	4564	5223	5707
	30	239	324	460	592	765	2853	3301	3726	4266	4662
	35	170	247	368	482	631	2404	2784	3145	3602	3938
	40	116	189	299	401	532	2075	2405	2718	3114	3405

I TABLE U: Two-Parameter Exponential Quantiles for Total Time

Explanation of the Tables

Table U gives the quantiles, $u_{1-\alpha} \times 10^4$, at various α levels of significance, for the total lifetime of observations from a future Two-Parameter Exponential random sample of size m based on a preliminary sample of size n where the preliminary test has been censored after the r^{th} failed unit. That is,

$$\begin{aligned} Pr[n(\sum_{i=1}^{m} Y_i - mX_1)/(mT_{(r)}) \geq u_{1-\alpha}] &= Pr[n(\bar{Y} - X_1)/T_{(r)} \geq u_{1-\alpha}] \\ &= 1-\alpha \end{aligned}$$

where the Y_i's are the failure times of the second sample, $X_1, X_2, \ldots, X_n$ are the ordered failure times for the first sample, and

$$T_{(r)} = \sum_{i=1}^{r}(X_i - X_1) + (n-r)(X_r - X_1) \ .$$

NOTE: The values given in these tables must be divided by 10^4 in order to obtain the proper quantile.

TABLE U: Two-Parameter Exponential Quantiles for Total Time

n= 3		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
3	5	-33673	-20882	-9531	-3811	234	43971	67998	101808	168734	244086
	10	-28089	-16933	-7034	-2045	1484	42372	64802	96359	158815	229131
	15	-26029	-15477	-6113	-1393	1946	41791	63662	94429	155322	223877
	20	-24957	-14718	-5633	-1054	2187	41491	63076	93440	153536	221193
	25	-24300	-14254	-5339	-847	2334	41308	62719	92839	152451	219563
	30	-23855	-13939	-5140	-706	2434	41184	62479	92435	151722	218468
	35	-23535	-13713	-4997	-605	2506	41095	62306	92144	151198	217682
	40	-23292	-13541	-4889	-528	2561	41028	62176	91925	150804	217090

n= 4		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
3	5	-22534	-13005	-4550	-288	2829	62700	96499	144077	238269	344326
	10	-16295	-8593	-1760	1686	4361	60680	92409	137065	225463	324990
	15	-14019	-6984	-741	2408	4930	59950	90955	134590	220965	318215
	20	-12840	-6151	-215	2783	5227	59573	90209	133323	218668	314758
	25	-12120	-5641	108	3013	5409	59343	89755	132554	217274	312661
	30	-11635	-5298	325	3168	5533	59188	89450	132037	216338	311252
	35	-11285	-5051	481	3280	5621	59077	89230	131665	215666	310242
	40	-11021	-4864	599	3364	5689	58993	89065	131386	215160	309481
4	5	-11956	-7427	-2840	-191	1954	32094	44990	61065	88728	115960
	10	-9051	-5121	-1141	1157	3068	30519	42158	56654	81587	106127
	15	-7935	-4235	-488	1676	3494	29940	41135	55076	79052	102647
	20	-7343	-3765	-143	1951	3720	29639	40606	54263	77750	100863
	25	-6977	-3475	72	2121	3859	29454	40283	53768	76957	99777
	30	-6728	-3277	218	2237	3954	29329	40065	53434	76423	99047
	35	-6547	-3133	323	2321	4023	29239	39908	53193	76039	98522
	40	-6410	-3025	403	2385	4074	29171	39790	53012	75749	98126

n= 5		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
3	5	-15000	-7678	-1180	2116	5049	81769	125504	187079	308991	446263
	10	-8623	-3169	1672	4255	6905	79360	120571	178583	293429	422740
	15	-6348	-1560	2692	5052	7593	78493	118824	175594	287980	414520
	20	-5185	-737	3216	5468	7952	78047	117929	174067	285201	410332
	25	-4479	-238	3536	5724	8171	77775	117385	173140	283516	407793
	30	-4006	96	3751	5896	8320	77592	117019	172517	282385	406089
	35	-3666	336	3905	6021	8427	77460	116757	172070	281573	404866
	40	-3411	517	4022	6115	8508	77361	116559	171734	280962	403946
4	5	-8420	-4620	-772	1458	3514	41613	58150	78771	114261	149202
	10	-5137	-2014	1148	3021	4888	39676	54655	73318	105426	137030
	15	-3878	-1015	1885	3628	5413	38966	53394	71370	102292	132727
	20	-3211	-486	2275	3950	5690	38596	52743	70367	100683	130521
	25	-2799	-158	2517	4150	5860	38369	52345	69756	99703	129179
	30	-2518	64	2681	4286	5977	38216	52077	69343	99044	128276
	35	-2315	226	2800	4385	6061	38106	51883	69047	98570	127627
	40	-2161	348	2890	4459	6124	38022	51738	68823	98212	127138
5	5	-5811	-3296	-574	1113	2701	27266	36393	47075	64183	79903
	10	-3647	-1476	874	2347	3800	25701	33716	43083	58071	71834
	15	-2786	-752	1450	2839	4229	25119	32739	41641	55881	68958
	20	-2323	-362	1759	3103	4457	24813	32230	40894	54752	67476
	25	-2033	-119	1953	3268	4599	24625	31918	40437	54062	66573
	30	-1835	48	2086	3381	4696	24498	31707	40128	53597	65963
	35	-1690	170	2183	3464	4766	24406	31555	39906	53262	65525
	40	-1581	262	2256	3526	4819	24336	31440	39738	53009	65194

TABLE U (Continued)

n= 6		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
3	5	-9700	-3930	1191	4023	7161	101021	154781	230481	380365	549137
	10	-3487	463	4047	6427	9343	98236	149031	220540	362114	521522
	15	-1338	1983	5090	7327	10149	97238	147000	217052	355739	511896
	20	-258	2747	5632	7797	10568	96725	145960	215272	352492	506996
	25	390	3206	5964	8086	10824	96413	145329	214192	350524	504027
	30	821	3513	6188	8281	10998	96202	144905	213467	349203	502036
	35	1129	3732	6349	8422	11123	96051	144601	212947	348255	500608
	40	1359	3896	6471	8528	11217	95937	144372	212555	347543	499533
4	5	-5715	-2473	810	2815	4997	51217	71424	96626	140006	182718
	10	-2207	311	2884	4617	6630	48929	67281	90155	129509	168248
	15	-874	1370	3687	5317	7251	48091	65790	87845	125789	163138
	20	-172	1927	4114	5689	7578	47656	65020	86657	123881	160521
	25	261	2271	4379	5919	7780	47389	64550	85933	122719	158928
	30	555	2504	4559	6076	7917	47209	64233	85445	121938	157858
	35	767	2672	4690	6190	8016	47079	64004	85094	121376	157088
	40	928	2800	4788	6276	8091	46981	63832	84830	120953	156508
5	5	-4036	-1802	614	2169	3849	33490	44601	57610	78447	97595
	10	-1613	234	2243	3616	5165	31625	41407	52844	71146	87956
	15	-648	1046	2897	4194	5676	30931	40242	51123	68533	84521
	20	-128	1483	3250	4504	5948	30568	39636	50232	67185	82753
	25	197	1756	3471	4698	6117	30345	39264	49687	66362	81674
	30	419	1944	3622	4831	6232	30193	39013	49319	65807	80947
	35	581	2080	3733	4927	6316	30083	38832	49054	65407	80424
	40	704	2183	3816	5000	6379	30000	38695	48854	65106	80029
6	5	-3115	-1418	494	1765	3134	24663	31958	40168	52748	63826
	10	-1271	188	1836	2976	4240	23097	29358	36389	47147	56611
	15	-515	846	2387	3469	4677	22507	28399	35011	45125	54020
	20	-103	1205	2688	3737	4911	22196	27897	34294	44077	52681
	25	158	1432	2878	3905	5057	22004	27588	33854	43435	51861
	30	337	1588	3009	4020	5158	21873	27379	33556	43001	51308
	35	468	1702	3104	4105	5230	21778	27228	33341	42689	50909
	40	568	1789	3177	4169	5286	21707	27113	33179	42452	50608

TABLE U (Continued)

n= 7		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
3	5	-5848	-1207	2977	5749	9222	120378	184220	274121	452129	652570
	10	40	2965	5980	8448	11724	117224	177662	262754	431222	620914
	15	2001	4388	7099	9457	12645	116096	175351	258772	423932	609899
	20	2967	5110	7682	9984	13123	115517	174169	256743	420223	604297
	25	3540	5547	8040	10307	13416	115164	173452	255512	417975	600904
	30	3919	5840	8282	10525	13614	114927	172970	254686	416468	598629
	35	4188	6051	8456	10683	13756	114757	172625	254093	415386	596997
	40	4389	6209	8588	10802	13863	114628	172364	253647	414573	595770
4	5	-3593	-789	2075	4052	6446	60872	84768	114575	165883	216403
	10	27	2086	4332	6102	8332	58240	79988	107097	153743	199662
	15	1383	3170	5215	6897	9048	57277	78269	104432	149447	193757
	20	2091	3741	5684	7319	9424	56778	77383	103062	147244	190734
	25	2525	4093	5976	7580	9656	56472	76841	102227	145903	188896
	30	2819	4332	6175	7758	9813	56265	76476	101665	145002	187660
	35	3031	4505	6319	7886	9927	56116	76214	101261	144354	186771
	40	3190	4636	6428	7984	10013	56003	76016	100956	143865	186102
5	5	-2589	-586	1594	3136	4971	39746	52851	68196	92780	115371
	10	20	1608	3406	4799	6499	37586	49147	62665	84303	104177
	15	1056	2482	4139	5461	7091	36784	47796	60670	81271	100191
	20	1613	2953	4535	5817	7406	36364	47095	59637	79708	98139
	25	1961	3248	4783	6039	7601	36105	46664	59006	78753	96888
	30	2199	3449	4953	6190	7734	35930	46373	58579	78109	96044
	35	2372	3596	5077	6301	7831	35803	46164	58272	77646	95437
	40	2503	3708	5171	6385	7904	35708	46005	58040	77296	94980
7	5	-1659	-387	1090	2164	3420	23037	29263	36084	46224	54898
	10	13	1103	2392	3377	4537	21464	26704	32428	40920	48175
	15	717	1731	2941	3878	4984	20866	25752	31084	38992	45744
	20	1107	2078	3244	4152	5225	20549	25251	30382	37988	44483
	25	1354	2299	3436	4325	5376	20352	24942	29950	37372	43709
	30	1526	2452	3569	4444	5480	20218	24732	29656	36955	43186
	35	1651	2564	3666	4531	5555	20121	24580	29444	36653	42808
	40	1748	2649	3741	4598	5613	20047	24465	29284	36425	42523

TABLE U (Continued)

n= 8		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
3	5	-2974	826	4497	7390	11252	139801	213761	317912	524141	756361
	10	2517	4834	7728	10390	14069	136279	206400	305126	500594	720688
	15	4295	6252	8940	11509	15103	135022	203809	300654	492395	708292
	20	5175	6982	9573	12093	15639	134377	202486	298376	488225	701992
	25	5702	7428	9961	12450	15967	133984	201683	296995	485700	698178
	30	6054	7728	10224	12692	16189	133720	201143	296069	484007	695621
	35	6305	7944	10413	12866	16348	133530	200756	295404	482792	693787
	40	6493	8106	10556	12998	16468	133387	200465	294904	481878	692408
4	5	-1898	558	3174	5229	7873	70561	98158	132584	191847	250200
	10	1757	3496	5645	7529	10010	67588	92746	124109	178077	231206
	15	3105	4620	6615	8419	10818	66502	90803	121092	173210	224513
	20	3807	5216	7131	8890	11243	65939	89801	119542	170715	221089
	25	4237	5585	7452	9182	11504	65594	89189	118598	169198	219007
	30	4528	5836	7670	9381	11682	65361	88777	117962	168177	217607
	35	4738	6017	7828	9525	11810	65193	88481	117505	167444	216602
	40	4897	6155	7948	9634	11907	65067	88257	117161	166891	215844
5	5	-1390	422	2457	4058	6076	46023	61128	78817	107158	133203
	10	1349	2741	4465	5935	7814	43572	56918	72528	97514	120465
	15	2431	3674	5279	6681	8486	42662	55385	70260	94067	115932
	20	3011	4178	5719	7082	8842	42186	54589	69088	92290	113600
	25	3373	4494	5995	7332	9064	41893	54100	68370	91206	112177
	30	3621	4710	6183	7502	9215	41695	53770	67886	90474	111219
	35	3801	4868	6321	7626	9324	41551	53532	67537	89948	110529
	40	3937	4988	6425	7720	9407	41443	53353	67274	89551	110009
8	5	-772	243	1467	2436	3624	21925	27455	33394	42031	49265
	10	795	1666	2760	3659	4753	20344	24920	29816	36919	42857
	15	1471	2281	3314	4169	5209	19737	23968	28492	35047	40526
	20	1849	2626	3623	4450	5457	19414	23466	27796	34070	39312
	25	2092	2847	3819	4629	5613	19213	23155	27367	33468	38565
	30	2260	3000	3955	4752	5720	19076	22943	27075	33060	38059
	35	2385	3113	4056	4842	5799	18976	22789	26864	32765	37694
	40	2480	3200	4132	4911	5858	18900	22673	26703	32541	37417

TABLE U (Continued)

n= 9		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
3	5	-760	2395	5890	8982	13259	159268	243368	361803	596318	860391
	10	4343	6413	9381	12282	16388	155378	235206	347603	570139	820715
	15	6044	7881	10693	13512	17534	153991	232336	342641	561035	806943
	20	6905	8643	11378	14152	18127	153279	230871	340115	556405	799946
	25	7426	9109	11798	14545	18490	152846	229982	338584	553603	795711
	30	7776	9424	12082	14810	18735	152554	229385	337557	551724	792872
	35	8027	9650	12287	15001	18911	152345	228957	336820	550376	790837
	40	8216	9821	12442	15145	19044	152188	228634	336266	549362	789306
4	5	-513	1662	4187	6372	9286	80273	111579	150635	217871	284075
	10	3131	4706	6886	8920	11670	76960	105539	141168	202480	262839
	15	4483	5893	7946	9905	12570	75752	103372	137802	197045	255364
	20	5193	6524	8511	10426	13042	75126	102256	136073	194261	251540
	25	5631	6916	8861	10749	13333	74743	101575	135020	192568	249217
	30	5927	7182	9099	10968	13531	74484	101116	134312	191429	247655
	35	6142	7375	9272	11126	13673	74297	100786	133802	190611	246533
	40	6304	7522	9403	11247	13781	74157	100537	133418	189995	245688
5	5	-383	1272	3255	4953	7171	52314	69424	89462	121568	151074
	10	2448	3728	5467	7044	9116	49574	64712	82418	110763	136800
	15	3569	4726	6363	7873	9866	48558	62997	79881	106904	131724
	20	4173	5268	6847	8318	10264	48027	62107	78569	104915	129113
	25	4550	5607	7150	8595	10511	47700	61561	77767	103702	127521
	30	4809	5840	7357	8784	10680	47478	61192	77225	102884	126448
	35	4997	6010	7508	8922	10802	47318	60927	76835	102295	125676
	40	5140	6139	7623	9026	10894	47197	60726	76541	101850	125094
9	5	-190	657	1728	2635	3777	21117	26158	31492	39118	45403
	10	1307	2043	3024	3868	4918	19527	23637	27966	34137	39211
	15	1968	2657	3586	4389	5383	18912	22684	26652	32303	36947
	20	2343	3004	3901	4677	5637	18583	22178	25959	31341	35763
	25	2585	3227	4103	4861	5798	18378	21865	25530	30748	35033
	30	2754	3384	4243	4988	5909	18237	21650	25238	30344	34538
	35	2879	3499	4346	5081	5990	18135	21495	25027	30052	34180
	40	2975	3587	4426	5153	6051	18057	21377	24866	29831	33909

TABLE U (Continued)

n= 10		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
3	5	928	3701	7212	10540	15251	178764	273022	405764	668611	964588
	10	5834	7848	10974	14142	18688	174506	264058	390150	639805	920916
	15	7540	9389	12389	15482	19945	172988	260909	384700	629794	905768
	20	8417	10192	13128	16179	20595	172209	259302	381925	624706	898075
	25	8950	10685	13581	16606	20992	171735	258327	380244	621626	893420
	30	9310	11017	13888	16895	21260	171417	257672	379116	619561	890300
	35	9568	11257	14109	17103	21453	171188	257202	378307	618081	888063
	40	9763	11438	14276	17260	21599	171015	256849	377698	616967	886381
4	5	629	2608	5151	7492	10688	90000	125023	168717	243938	318006
	10	4284	5809	8083	10288	13318	86350	118357	158261	226933	294537
	15	5672	7069	9235	11367	14308	85021	115968	154547	220932	286282
	20	6406	7742	9848	11937	14828	84332	114738	152640	217859	282062
	25	6860	8159	10228	12290	15148	83910	113987	151479	215991	279497
	30	7169	8443	10486	12530	15365	83625	113482	150698	214735	277774
	35	7393	8649	10674	12703	15522	83420	113118	150136	213833	276536
	40	7562	8806	10816	12835	15641	83265	112844	149713	213153	275603
5	5	475	2016	4016	5832	8258	58617	77734	100125	136002	168974
	10	3391	4629	6433	8134	10408	55588	72522	92330	124040	153170
	15	4562	5700	7411	9046	11236	54466	70626	89523	119770	147552
	20	5195	6281	7940	9534	11676	53880	69643	88073	117571	144664
	25	5592	6646	8270	9839	11948	53519	69040	87187	116229	142903
	30	5864	6896	8497	10046	12134	53275	68633	86588	115325	141717
	35	6062	7079	8661	10197	12268	53099	68339	86157	114674	140864
	40	6213	7217	8787	10312	12370	52965	68117	85832	114183	140221
10	5	214	945	1922	2786	3896	20503	25184	30076	36980	42596
	10	1664	2314	3224	4032	5049	18904	22670	26587	32094	36562
	15	2319	2931	3795	4562	5522	18282	21714	25279	30284	34343
	20	2695	3283	4117	4857	5782	17947	21205	24587	29333	33180
	25	2938	3511	4324	5046	5947	17737	20888	24157	28744	32461
	30	3109	3670	4468	5177	6061	17594	20671	23864	28343	31973
	35	3236	3788	4575	5273	6144	17489	20513	23651	28053	31619
	40	3333	3879	4656	5347	6208	17409	20393	23490	27832	31351

TABLE U (Continued)

n= 12		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
3	5	3438	5943	9734	13594	19202	217814	332420	493823	813426	1173315
	10	8373	10495	14056	17797	23250	212815	321853	475384	779369	1121658
	15	10192	12214	15683	19357	24726	211034	318143	468953	767546	1103761
	20	11139	13114	16532	20168	25489	210121	316251	465681	761540	1094676
	25	11719	13666	17053	20665	25955	209566	315103	463699	757905	1089180
	30	12111	14039	17406	21001	26269	209192	314333	462370	755469	1085496
	35	12393	14309	17660	21243	26496	208924	313780	461416	753722	1082856
	40	12606	14512	17852	21426	26666	208722	313364	460699	752408	1080870
4	5	2421	4258	6991	9689	13471	109488	151955	204940	296160	385983
	10	6263	7843	10398	12978	16587	105165	144042	192516	275937	358063
	15	7775	9269	11735	14243	17758	103592	141210	188108	268810	348256
	20	8581	10031	12446	14912	18371	102778	139753	185847	265163	343244
	25	9082	10505	12886	15325	18749	102280	138864	184470	262947	340200
	30	9424	10828	13186	15606	19005	101943	138266	183545	261457	338155
	35	9671	11062	13404	15809	19190	101701	137835	182879	260387	336687
	40	9859	11239	13568	15962	19330	101518	137510	182377	259581	335581
5	5	1869	3324	5472	7555	10416	71242	94382	121486	164917	204834
	10	5021	6293	8301	10277	12973	67641	88174	112194	150652	185980
	15	6319	7518	9445	11353	13956	66308	85919	108854	145565	179286
	20	7025	8184	10062	11928	14477	65613	84750	107128	142947	175846
	25	7469	8602	10448	12287	14800	65185	84033	106074	141350	173750
	30	7773	8889	10712	12531	15019	64895	83550	105362	140274	172338
	35	7995	9097	10904	12709	15178	64686	83201	104850	139499	171323
	40	8164	9256	11050	12844	15299	64528	82938	104463	138915	170557
10	5	874	1591	2640	3625	4923	24872	30514	36412	44735	51508
	10	2541	3202	4194	5117	6305	22957	27501	32230	38879	44275
	15	3307	3932	4875	5751	6873	22211	26356	30862	36711	41616
	20	3747	4349	5259	6104	7184	21810	25746	29833	35570	40221
	25	4033	4618	5506	6330	7382	21559	25366	29318	34865	39360
	30	4234	4807	5678	6486	7518	21387	25107	28967	34384	38775
	35	4383	4947	5805	6601	7618	21262	24918	28712	34036	38351
	40	4497	5055	5903	6690	7695	21166	24774	28519	33772	38030
12	5	721	1317	2189	3003	4070	19631	23816	28112	34055	38800
	10	2124	2680	3508	4271	5242	18016	21308	24669	29295	32975
	15	2782	3310	4097	4819	5731	17380	20344	23364	27515	30815
	20	3164	3673	4433	5127	6002	17035	19827	22669	26574	29675
	25	3415	3911	4650	5324	6174	16818	19503	22236	25988	28968
	30	3592	4078	4802	5463	6294	16669	19281	21939	25589	28487
	35	3724	4202	4914	5565	6382	16559	19120	21724	25298	28137
	40	3826	4297	5001	5643	6450	16476	18996	21559	25078	27871

TABLE U (Continued)

n= 15		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
3	5	6277	8914	13354	18082	25074	276471	421649	626113	1030986	1486896
	10	11732	14205	18536	23186	30032	270356	408671	603432	989053	1423266
	15	13808	16223	20489	25079	31836	268178	404119	595530	974511	1401243
	20	14898	17283	21509	26063	32769	267061	401798	591510	967126	1390068
	25	15569	17935	22136	26666	33338	266381	400390	589075	962657	1383309
	30	16024	18376	22559	27073	33722	265925	399445	587442	959662	1378780
	35	16352	18695	22865	27367	33998	265596	398767	586271	957515	1375534
	40	16600	18936	23098	27588	34206	265349	398257	585390	955900	1373093
4	5	4526	6459	9637	12920	17612	138766	192421	259367	374627	488122
	10	8879	10691	13763	16944	21450	133436	182643	244000	349594	453551
	15	10629	12383	15380	18490	22889	131500	179149	238555	340784	441424
	20	11568	13289	16240	19305	23643	130498	177352	235764	336280	435231
	25	12153	13852	16773	19809	24106	129885	176257	234066	333543	431471
	30	12552	14236	17136	20151	24420	129472	175519	232924	331704	428946
	35	12842	14515	17398	20399	24647	129174	174989	232103	330383	427132
	40	13062	14727	17597	20586	24818	128950	174589	231485	329388	425767
5	5	3545	5079	7566	10091	13628	90213	119397	153583	208365	258715
	10	7180	8621	11016	13439	16790	85755	111701	142056	190658	235305
	15	8700	10088	12408	14759	18003	84109	108910	137918	184352	227005
	20	9530	10885	13159	15464	18645	83250	107464	135782	181109	222743
	25	10052	11386	13628	15903	19042	82722	106579	134477	179131	220146
	30	10411	11729	13949	16202	19312	82365	105981	133597	177799	218398
	35	10673	11979	14182	16420	19508	82107	105550	132963	176840	217141
	40	10872	12169	14359	16585	19656	81912	105224	132485	176117	216193
10	5	1708	2470	3677	4860	6452	31438	38523	45932	56387	64895
	10	3714	4446	5604	6717	8177	29049	34766	40715	49080	55870
	15	4645	5343	6448	7506	8884	28120	33338	38760	46376	52554
	20	5180	5855	6924	7945	9272	27621	32578	37726	44954	50815
	25	5529	6186	7229	8224	9517	27309	32105	37085	44075	49742
	30	5773	6418	7442	8419	9687	27095	31781	36647	43477	49012
	35	5955	6590	7598	8562	9811	26938	31546	36330	43043	48484
	40	6094	6722	7719	8671	9906	26819	31367	36089	42714	48083
15	5	1126	1635	2434	3209	4238	18813	22550	26319	31430	35433
	10	2515	3010	3779	4504	5435	17178	20042	22910	26776	29790
	15	3188	3660	4391	5074	5942	16524	19065	21602	25016	27674
	20	3586	4041	4744	5398	6226	16167	18536	20900	24077	26550
	25	3850	4292	4975	5608	6408	15940	18203	20459	23491	25849
	30	4037	4470	5137	5756	6536	15783	17974	20157	23088	25369
	35	4178	4603	5258	5865	6630	15668	17806	19935	22795	25019
	40	4287	4706	5352	5949	6702	15580	17677	19767	22572	24753

TABLE U (Continued)

n= 20		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
3	5	10279	13482	19192	25440	34786	374335	570532	846854	1394024	2010168
	10	16917	20114	25836	32052	41256	366349	553527	817095	1338956	1926578
	15	19497	22667	28345	34505	43609	363504	547566	806734	1319875	1897673
	20	20861	24013	29659	35780	44824	362045	544526	801465	1310189	1883011
	25	21705	24843	30466	36562	45566	361158	542683	798275	1304329	1874145
	30	22278	25406	31012	37090	46066	360561	541446	796135	1300402	1868204
	35	22693	25814	31407	37471	46426	360133	540558	794601	1297586	1863947
	40	23007	26122	31705	37758	46697	359810	539890	793447	1295469	1860746
4	5	7520	9850	13908	18221	24464	187626	259954	350204	505587	658594
	10	12905	15218	19242	23469	29499	180620	247075	329942	472558	612964
	15	15099	17374	21332	25481	31384	178078	242480	322774	460952	596982
	20	16282	18531	22444	26543	32370	176764	240118	319102	455021	588826
	25	17021	19252	23133	27199	32976	175960	238679	316869	451420	583877
	30	17526	19744	23603	27644	33386	175418	237710	315367	449000	580553
	35	17894	20101	23942	27966	33683	175028	237013	314288	447262	578166
	40	18172	20371	24200	28210	33907	174733	236488	313475	445954	576370
5	5	5947	7788	10950	14255	18946	121874	161147	207154	280881	348645
	10	10496	12319	15435	18640	23108	115995	150981	191915	257457	317668
	15	12416	14200	17243	20365	24702	113827	147300	186452	249128	306701
	20	13469	15223	18218	21286	25544	112696	145394	183634	244847	301074
	25	14131	15866	18826	21859	26065	112002	144227	181914	242238	297647
	30	14587	16307	19243	22250	26420	111532	143440	180754	240481	295341
	35	14920	16628	19545	22533	26676	111193	142872	179919	239217	293682
	40	15173	16873	19775	22748	26871	110937	142444	179289	238264	292432
10	5	2925	3835	5354	6889	8986	42396	51891	61820	75833	87237
	10	5515	6418	7898	9350	11276	39223	46897	54884	66117	75235
	15	6722	7592	9010	10393	12213	37991	45000	52287	62524	70828
	20	7416	8261	9636	10972	12727	37329	43992	50915	60636	68518
	25	7868	8694	10037	11342	13052	36915	43365	50064	59468	67093
	30	8185	8997	10317	11598	13276	36631	42936	49483	58674	66125
	35	8420	9221	10523	11787	13441	36424	42624	49062	58098	65423
	40	8601	9393	10681	11931	13567	36266	42387	48742	57662	64891
15	5	1943	2549	3553	4555	5906	25355	30354	35396	42235	47592
	10	3761	4365	5340	6279	7501	23177	27013	30855	36035	40075
	15	4646	5226	6153	7037	8176	22307	25712	29113	33691	37257
	20	5171	5730	6621	7468	8554	21831	25008	28178	32441	35759
	25	5518	6062	6927	7748	8797	21529	24565	27592	31661	34826
	30	5765	6297	7143	7943	8967	21321	24259	27189	31125	34187
	35	5950	6473	7303	8089	9092	21168	24036	26895	30735	33722
	40	6094	6609	7427	8201	9188	21050	23865	26670	30437	33367
20	5	1455	1910	2660	3405	4401	18045	21375	24675	29063	32437
	10	2856	3312	4039	4733	5627	16384	18859	21289	24496	26947
	15	3557	3993	4682	5331	6157	15708	17862	19971	22745	24861
	20	3979	4399	5058	5676	6458	15334	17317	19255	21802	23742
	25	4262	4669	5306	5902	6654	15095	16971	18802	21208	23039
	30	4466	4862	5483	6062	6791	14928	16731	18489	20798	22555
	35	4620	5008	5615	6181	6893	14805	16554	18260	20498	22201
	40	4740	5121	5718	6274	6972	14711	16419	18084	20268	21930

TABLE U (Continued)

n= 25		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
3	5	13978	17861	24923	32726	44451	472256	719511	1067745	1757315	2533812
	10	21918	25891	33049	40854	52434	462392	698472	1030900	1689105	2430253
	15	25037	29000	36124	43871	55336	458878	691098	1018077	1665481	2394461
	20	26694	30643	37736	45441	56835	457076	687339	1011557	1653491	2376310
	25	27721	31657	38727	46403	57751	455980	685059	1007610	1646238	2365334
	30	28419	32346	39398	47053	58368	455243	683530	1004963	1641378	2357982
	35	28925	32845	39882	47522	58812	454713	682432	1003064	1637894	2352712
	40	29308	33222	40249	47876	59146	454314	681606	1001636	1635275	2348750
4	5	10292	13104	18102	23473	31285	236522	327541	441115	636657	829209
	10	16778	19637	24652	29945	37515	227841	311564	415965	595643	772538
	15	19440	22271	27220	32426	39845	224694	305868	407076	581244	752707
	20	20879	23685	28587	33735	41064	223067	302941	402523	573890	742591
	25	21779	24567	29434	34543	41813	222072	301158	399756	569424	736453
	30	22395	25169	30011	35092	42320	221401	299958	397895	566425	732332
	35	22843	25606	30429	35489	42686	220918	299095	396558	564271	729374
	40	23184	25938	30746	35790	42963	220554	298445	395551	562649	727147
5	5	8173	10388	14273	18380	24240	153561	202932	260772	353461	438654
	10	13681	15926	19797	23801	29401	146262	190300	241827	324330	400125
	15	16018	18228	22023	25932	31374	143573	185731	235042	313984	386498
	20	17301	19482	23223	27069	32416	142172	183366	231545	308668	379509
	25	18109	20269	23972	27776	33061	141312	181919	229410	305429	375254
	30	18666	20810	24485	28258	33500	140730	180943	227971	303248	372391
	35	19072	21204	24857	28608	33817	140309	180239	226935	301679	370333
	40	19381	21504	25140	28874	34057	139992	179708	226154	300497	368781
10	5	4058	5146	7003	8901	11510	53364	65271	77722	95296	109598
	10	7240	8339	10160	11962	14362	49409	59043	69072	83176	94624
	15	8724	9788	11539	13258	15529	47874	56680	65835	78697	89130
	20	9579	10614	12314	13977	16167	47050	55424	64125	76344	86252
	25	10134	11148	12812	14436	16572	46535	54643	63065	74890	84476
	30	10524	11522	13158	14754	16851	46182	54109	62343	73900	83270
	35	10813	11799	13413	14987	17055	45924	53721	61818	73183	82396
	40	11036	12011	13609	15166	17211	45728	53428	61420	72639	81734
15	5	2705	3429	4653	5890	7568	31903	38164	44481	53049	59761
	10	4953	5684	6879	8040	9559	29184	33994	38811	45307	50373
	15	6050	6753	7891	8985	10401	28097	32369	36637	42381	46855
	20	6699	7379	8474	9522	10873	27504	31491	35470	40821	44986
	25	7129	7791	8854	9870	11175	27128	30938	34738	39846	43821
	30	7435	8083	9122	10114	11387	26868	30557	34235	39178	43023
	35	7664	8301	9322	10295	11543	26677	30278	33868	38691	42443
	40	7842	8470	9476	10434	11663	26531	30065	33588	38320	42000
20	5	2030	2573	3486	4404	5641	22700	26870	31001	36496	40720
	10	3769	4318	5208	6064	7173	20625	23726	26771	30789	33861
	15	4641	5167	6009	6811	7835	19781	22481	25123	28601	31254
	20	5166	5672	6479	7241	8211	19314	21800	24229	27423	29856
	25	5518	6009	6789	7523	8455	19015	21367	23684	26681	28978
	30	5772	6250	7009	7723	8627	18807	21067	23273	26169	28374
	35	5963	6432	7174	7872	8755	18653	20847	22986	25794	27931
	40	6112	6573	7303	7988	8853	18535	20677	22766	25507	27593

TABLE U (Continued)

n= 25		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
25	5	1625	2059	2787	3517	4497	17605	20710	23754	27754	30794
	10	3044	3483	4192	4870	5743	15926	18185	20376	23230	25384
	15	3767	4188	4857	5488	6290	15234	17173	19046	21478	23308
	20	4209	4612	5250	5849	6603	14848	16615	18319	20527	22187
	25	4508	4898	5513	6087	6808	14600	16258	17856	19924	21478
	30	4724	5104	5700	6256	6954	14425	16009	17534	19507	20988
	35	4889	5259	5842	6383	7062	14296	15826	17297	19200	20628
	40	5018	5382	5952	6483	7146	14196	15684	17114	18964	20352

TABLE U (Continued)

n= 30		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
3	5	17557	22160	30604	39978	54092	570205	868535	1288707	2120729	3057636
	10	26848	31613	40223	49627	63590	558459	843458	1244772	2039372	2934102
	15	30522	35288	43870	53210	67043	554274	834671	1229486	2011204	2891422
	20	32478	37232	45782	55076	68827	552128	830191	1221714	1996909	2869780
	25	33691	38434	46958	56220	69916	550823	827475	1217009	1988263	2856694
	30	34517	39250	47755	56993	70650	549945	825652	1213854	1982469	2847929
	35	35115	39841	48330	57550	71179	549314	824344	1211592	1978316	2841647
	40	35569	40288	48765	57971	71577	548839	823359	1209890	1975193	2836924
4	5	12973	16296	22259	28700	38090	285437	395155	532063	767782	999897
	10	20591	24011	30031	36398	45515	275080	376080	502027	718789	932192
	15	23731	27128	33080	39349	48290	271327	369284	491418	701599	908515
	20	25431	28803	34702	40906	49742	269387	365792	485986	692821	896440
	25	26495	29848	35709	41867	50634	268201	363666	482684	687492	889115
	30	27224	30562	36394	42520	51238	267402	362235	480464	683913	884197
	35	27754	31080	36891	42992	51674	266826	361206	478869	681344	880667
	40	28157	31474	37267	43350	52003	266391	360430	477667	679409	878010
5	5	10327	12940	17568	22486	29523	185261	244736	314413	426073	528704
	10	16814	19494	24132	28943	35680	176544	229640	291766	391242	482630
	15	19574	22221	26778	31480	38032	173334	224183	283661	378879	466346
	20	21091	23707	28204	32834	39275	171662	221359	279485	372530	457996
	25	22047	24641	29095	33675	40044	170636	219633	276936	368662	452915
	30	22706	25282	29704	34249	40566	169941	218467	275218	366058	449496
	35	23187	25750	30147	34666	40944	169440	217627	273982	364185	447038
	40	23553	26105	30483	34982	41231	169061	216994	273049	362773	445186
10	5	5156	6434	8638	10905	14029	64337	78656	93631	114767	131968
	10	8933	10235	12407	14564	17442	59602	71197	83269	100246	114027
	15	10695	11961	14053	16112	18837	57764	68369	79393	94883	107447
	20	11711	12944	14978	16971	19801	56779	66866	77347	92066	104002
	25	12370	13580	15571	17518	20084	56162	65931	76078	90325	101877
	30	12834	14025	15983	17898	20417	55740	65293	75214	89141	100433
	35	13177	14354	16287	18176	20661	55432	64828	74586	88283	99387
	40	13441	14607	16521	18390	20848	55198	64476	74110	87633	98595
15	5	3445	4293	5744	7220	9227	38454	45978	53570	63867	71935
	10	6123	6987	8408	9795	11613	35194	40978	46772	54584	60679
	15	7430	8263	9618	10926	12622	33893	39031	44166	51078	56461
	20	8203	9010	10315	11568	13186	33182	37979	42768	49208	54221
	25	8716	9501	10769	11984	13548	32731	37317	41892	48041	52825
	30	9080	9850	11090	12276	13801	32420	36861	41289	47240	51870
	35	9353	10110	11328	12492	13988	32191	36527	40849	46657	51174
	40	9565	10311	11512	12659	14132	32016	36272	40514	46212	50644
20	5	2587	3223	4305	5399	6878	27358	32367	37330	43931	49006
	10	4664	5312	6368	7390	8716	24869	28596	32256	37087	40779
	15	5705	6327	7328	8284	9510	23857	27103	30280	34463	37653
	20	6333	6932	7890	8800	9961	23297	26286	29208	33049	35976
	25	6754	7335	8261	9138	10253	22939	25768	28531	32160	34924
	30	7057	7623	8525	9377	10459	22689	25408	28062	31546	34199
	35	7285	7840	8723	9556	10612	22505	25144	27718	31097	33668
	40	7463	8009	8876	9694	10730	22364	24941	27454	30753	33263

TABLE U (Continued)

n= 30		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
25	5	2072	2581	3443	4313	5484	21216	24945	28600	33405	37057
	10	3769	4287	5128	5936	6979	19201	21915	24548	27978	30566
	15	4635	5131	5925	6677	7635	18371	20701	22953	25875	28076
	20	5164	5640	6397	7110	8011	17908	20032	22080	24734	26730
	25	5522	5982	6711	7395	8257	17610	19604	21525	24012	25880
	30	5781	6228	6936	7598	8431	17401	19305	21139	23511	25293
	35	5978	6415	7105	7751	8561	17246	19085	20854	23143	24861
	40	6132	6561	7238	7870	8662	17126	18915	20635	22860	24530
30	5	1728	2152	2869	3591	4560	17320	20282	23164	26923	29758
	10	3163	3594	4293	4962	5821	15627	17749	19789	22424	24396
	15	3905	4317	4974	5595	6380	14924	16725	18450	20668	22323
	20	4362	4757	5382	5967	6703	14529	16157	17712	19709	21197
	25	4673	5054	5655	6214	6916	14272	15791	17241	19099	20482
	30	4900	5270	5851	6392	7067	14092	15536	16912	18675	19986
	35	5074	5434	6000	6525	7181	13958	15346	16668	18361	19621
	40	5210	5563	6116	6630	7269	13854	15199	16481	18120	19340

TABLE U (Continued)

n= 35		α										
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
3	5	21076	26418	36258	47210	63720	668168	1017585	1509709	2484211	3581561
	10	31743	37308	47378	58383	74734	654538	988468	1458682	2389705	3438050
	15	35979	41553	51598	62536	78738	649683	978266	1440931	2356991	3388479
	20	38238	43801	53812	64698	80808	647192	973065	1431907	2340391	3363345
	25	39640	45192	55174	66024	82071	645677	969911	1426444	2330351	3348150
	30	40595	46136	56097	66920	82923	644659	967795	1422781	2323623	3337971
	35	41287	46820	56764	67566	83535	643927	966277	1420154	2318801	3330676
	40	41811	47337	57268	68053	83998	643375	965134	1418178	2315175	3325191
4	5	15610	19458	26397	33913	44886	334361	462784	623033	898939	1170627
	10	24374	28362	35393	42839	53506	322329	440613	588112	841968	1091892
	15	27996	31965	38925	46260	56727	317970	432715	575782	821988	1064370
	20	29960	33903	40804	48065	58411	315717	428659	569471	811788	1050336
	25	31191	35112	41971	49180	59446	314340	426189	565635	805596	1041825
	30	32033	35938	42765	49937	60147	313412	424527	563056	801438	1036110
	35	32646	36538	43340	50485	60653	312743	423332	561203	798452	1032009
	40	33112	36993	43776	50900	61035	312239	422431	559807	796204	1028922
5	5	12445	15467	20846	26581	34798	216969	286550	368068	498704	618777
	10	19921	23041	28454	34075	41952	206833	268991	341721	458176	565163
	15	23108	26196	31521	37018	44684	203103	262646	332296	443798	546223
	20	24860	27916	33173	38588	46127	201160	259365	327441	436415	536514
	25	25966	28997	34205	39565	47019	199968	257358	324478	431919	530607
	30	26728	29740	34912	40231	47626	199161	256004	322482	428892	526632
	35	27284	30281	35425	40714	48065	198579	255028	321045	426715	523775
	40	27708	30693	35815	41081	48397	198139	254292	319961	425074	521622
10	5	6236	7709	10265	12903	16544	75313	92045	109544	134244	154344
	10	10610	12120	14647	17160	20519	69797	83356	97471	117323	133438
	15	12651	14122	16559	18960	22142	67658	80062	92958	111076	125774
	20	13827	15263	17632	19958	23030	66511	78313	90575	107797	121762
	25	14592	16000	18321	20594	23592	65794	77225	89098	105770	119287
	30	15128	16516	18800	21035	23979	65303	76481	88092	104392	117606
	35	15526	16897	19153	21359	24263	64945	75942	87362	103393	116389
	40	15832	17191	19424	21607	24480	64672	75531	86808	102636	115467
15	5	4171	5149	6830	8546	10884	45006	53795	62661	74688	84112
	10	7280	8280	9930	11545	13664	41207	47966	54736	63866	70988
	15	8797	9764	11339	12862	14839	39690	45697	51700	59779	66072
	20	9696	10631	12149	13609	15496	38862	44471	50070	57600	63462
	25	10291	11202	12678	14093	15918	38338	43700	49049	56240	61835
	30	10714	11607	13050	14433	16213	37975	43168	48348	55308	60722
	35	11031	11909	13327	14684	16430	37709	42779	47835	54628	59912
	40	11277	12143	13541	14878	16597	37505	42482	47444	54110	59295
20	5	3135	3868	5120	6392	8114	32017	37865	43661	51369	57295
	10	5550	6298	7524	8712	10257	29114	33468	37744	43387	47700
	15	6761	7480	8642	9754	11182	27934	31727	35440	40327	44055
	20	7490	8184	9297	10356	11708	27282	30775	34190	38679	42100
	25	7980	8652	9729	10749	12048	26865	30171	33400	37642	40873
	30	8332	8988	10036	11028	12288	26574	29752	32854	36927	40028
	35	8597	9240	10266	11235	12466	26359	29444	32453	36403	39410
	40	8804	9436	10445	11397	12604	26194	29207	32148	36002	38938

TABLE U (Continued)

n= 35		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
25	5	2512	3097	4096	5107	6470	24827	29181	33448	39057	43321
	10	4487	5085	6060	6999	8214	22477	25647	28722	32727	35751
	15	5495	6068	6989	7863	8979	21510	24231	26861	30275	32848
	20	6110	6661	7539	8367	9417	20970	23451	25843	28945	31277
	25	6527	7059	7905	8700	9704	20622	22951	25196	28102	30286
	30	6829	7346	8167	8937	9907	20378	22603	24748	27518	29600
	35	7058	7564	8365	9115	10059	20198	22346	24414	27088	29097
	40	7238	7734	8519	9253	10176	20058	22148	24159	26759	28711
30	5	2096	2583	3414	4252	5380	20268	23725	27090	31477	34786
	10	3766	4265	5074	5851	6851	18293	20770	23153	26229	28531
	15	4630	5107	5869	6589	7503	17473	19576	21590	24181	26114
	20	5163	5619	6344	7024	7880	17011	18913	20730	23062	24800
	25	5526	5986	6662	7312	8128	16713	18487	20180	22351	23967
	30	5791	6218	6891	7519	8305	16502	18188	19796	21856	23388
	35	5993	6409	7064	7675	8437	16346	17967	19512	21490	22961
	40	6152	6559	7200	7796	8540	16225	17796	19293	21209	22634
35	5	1798	2216	2926	3643	4604	17121	19984	22755	26348	29045
	10	3246	3673	4364	5027	5877	15418	17443	19381	21865	23714
	15	4002	4410	5059	5672	6446	14705	16410	18033	20105	21642
	20	4471	4861	5477	6054	6776	14302	15834	17287	19140	20511
	25	4794	5168	5759	6309	6995	14040	15461	16809	18523	19791
	30	5029	5392	5963	6492	7151	13855	15200	16473	18093	19289
	35	5210	5563	6117	6631	7269	13716	15005	16225	17774	18918
	40	5353	5698	6239	6740	7361	13609	14854	16032	17528	18632

TABLE U (Continued)

n= 40		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
3	5	24560	30648	41896	54430	73340	766140	1166650	1730735	2647737	4105548
	10	38618	42988	54521	67131	85870	750625	1133491	1672614	2740078	3942058
	15	41421	47806	59316	71853	90427	745098	1121874	1652399	2702818	3885596
	20	43985	50359	61833	74312	92782	742263	1115952	1642123	2683912	3856969
	25	45577	51939	63382	75820	94219	740538	1112361	1635901	2672477	3839663
	30	46661	53012	64431	76840	95189	739379	1109952	1631730	2664816	3828070
	35	47447	53789	65189	77574	95886	738546	1108223	1628738	2659324	3819763
	40	48042	54377	65762	78129	96412	737918	1106922	1626489	2655195	3813517
4	5	18220	22600	30523	39117	51678	383292	530423	714016	1030116	1341383
	10	28140	32700	40746	49272	61491	369583	505154	674211	965169	1251620
	15	32249	36790	44761	53164	65158	364619	496157	660161	942399	1220254
	20	34478	38992	46898	55218	67075	362053	491536	652970	930776	1204263
	25	35875	40366	48225	56487	68254	360485	488723	648600	923722	1194564
	30	36832	41305	49128	57348	69051	359427	486829	645662	918984	1188054
	35	37528	41987	49782	57971	69627	358666	485468	643551	915583	1183381
	40	38057	42505	50278	58443	70062	358092	484442	641962	913023	1179864
5	5	14541	17978	24116	30669	40070	248681	328370	421732	571347	708865
	10	23012	26577	32767	39200	48219	237127	308349	391685	525124	647713
	15	26629	30161	36255	42550	51331	232877	301117	380942	508731	626118
	20	28618	32115	38135	44338	52974	230663	297378	375408	500316	615051
	25	29875	33344	39309	45449	53990	229305	295091	372031	495191	608318
	30	30740	34188	40112	46207	54681	228385	293548	369756	491742	603788
	35	31372	34803	40696	46757	55181	227722	292436	368119	489261	600532
	40	31853	35271	41140	47174	55559	227221	291597	366884	487391	598079
10	5	7304	8976	11887	14898	19058	86291	105437	125460	153723	176724
	10	12276	13997	16881	19753	23593	79995	95517	111677	134404	152854
	15	14598	16276	19059	21804	25444	77555	91759	106526	127275	144106
	20	15935	17574	20282	22942	26456	76247	89763	103808	123532	139528
	25	16805	18414	21066	23667	27097	75429	88522	102123	121220	136704
	30	17415	19001	21612	24170	27538	74868	87674	100975	119647	134786
	35	17867	19435	22014	24539	27862	74460	87058	100142	118508	133398
	40	18215	19768	22323	24821	28109	74149	86590	99510	117645	132346
15	5	4891	5999	7912	9869	12540	51560	61612	71754	85511	96290
	10	8430	9569	11450	13293	15714	47221	54955	62703	73150	81300
	15	10159	11259	13056	14795	17055	45490	52365	59235	68483	75686
	20	11161	12248	13980	15648	17805	44545	50965	57375	65996	72706
	25	11859	12898	14583	16200	18286	43946	50085	56210	64443	70849
	30	12341	13359	15007	16587	18622	43532	49478	55409	63378	69579
	35	12701	13703	15323	16874	18870	43228	49034	54824	62602	68653
	40	12981	13970	15567	17095	19060	42996	48695	54378	62011	67949
20	5	3678	4508	5934	7384	9350	36676	43365	49992	58807	65584
	10	6430	7281	8677	10033	11796	33361	38342	43233	49688	54623
	15	7810	8629	9954	11223	12853	32013	36353	40601	46194	50460
	20	8642	9431	10700	11909	13453	31268	35266	39174	44312	48227
	25	9200	9965	11193	12358	13842	30792	34576	38272	43127	46825
	30	9600	10348	11543	12676	14116	30460	34097	37648	42310	45860
	35	9903	10635	11806	12913	14319	30215	33745	37190	41712	45154
	40	10139	10859	12010	13096	14476	30027	33475	36839	41255	44615

TABLE U (Continued)

n= 40		α									
r	m	.005	.01	.025	.05	.1	.9	.95	.975	.99	.995
25	5	2948	3611	4747	5899	7455	28439	33417	38297	44711	49586
	10	5200	5880	6989	8061	9447	25754	29380	32896	37478	40936
	15	6350	7002	8050	9048	10321	24649	27762	30771	34677	37618
	20	7052	7678	8678	9623	10822	24032	26871	29608	33156	35825
	25	7527	8133	9096	10003	11150	23635	26301	28868	32194	34693
	30	7871	8460	9395	10274	11381	23357	25903	28354	31527	33910
	35	8133	8708	9621	10477	11554	23151	25609	27975	31036	33335
	40	8338	8902	9797	10635	11689	22991	25383	27684	30660	32894
30	5	2460	3012	3957	4912	6199	23216	27169	31016	36032	39816
	10	4366	4932	5853	6739	7880	20960	23792	26517	30035	32668
	15	5352	5894	6761	7583	8626	20022	22427	24731	27694	29906
	20	5960	6478	7303	8079	9056	19495	21670	23749	26417	28405
	25	6375	6875	7667	8408	9340	19154	21183	23120	25804	27452
	30	6677	7162	7929	8644	9541	18914	20842	22682	25038	26791
	35	6907	7380	8126	8822	9692	18735	20589	22357	24621	26304
	40	7088	7552	8282	8961	9810	18596	20394	22107	24299	25929
35	5	2110	2584	3392	4208	5306	19611	22884	26052	30160	33243
	10	3763	4248	5035	5790	6760	17664	19981	22196	25037	27151
	15	4626	5089	5829	6527	7410	16850	18800	20656	23026	24784
	20	5163	5605	6307	6963	7788	16389	18141	19804	21923	23491
	25	5531	5956	6628	7255	8038	16090	17716	19257	21218	22668
	30	5800	6212	6861	7464	8217	15878	17417	18874	20726	22094
	35	6006	6407	7038	7623	8351	15720	17195	18589	20362	21671
	40	6169	6561	7177	7747	8456	15598	17022	18370	20081	21344
40	5	1848	2262	2969	3681	4638	16973	19764	22454	25928	28524
	10	3307	3731	4418	5076	5919	15262	17218	19079	21455	23215
	15	4075	4479	5124	5730	6495	14542	16177	17725	19692	21143
	20	4554	4940	5550	6120	6832	14133	15593	16972	18720	20007
	25	4885	5256	5839	6381	7056	13866	15215	16488	18098	19282
	30	5128	5487	6049	6570	7217	13676	14949	16147	17662	18775
	35	5315	5663	6209	6713	7338	13535	14750	15894	17338	18400
	40	5463	5803	6335	6825	7433	13424	14596	15698	17089	18110

J TABLE P: Binomial Percentile Intervals, (a, b), for the Poisson Distribution

Explanation of the Tables

Table P gives the lower limit, a, and the upper limit, b, for various α levels of significance, to contain future observations from a Poisson process of length s based on r failures occurring in a previous interval of length t. The value of p is determined from s and t using $p = \frac{s}{s+t}$.That is,

$$Pr[a(X) \leq Y \leq b(X)] \doteq 1 - \alpha$$

where Y is the number of future failures and X is the number of failures in the prior test.

TABLE P: Binomial Percentile Intervals, (a, b), for the Poisson Distribution

p=.95	α							
	.1		.075		.05		.01	
r	a	b	a	b	a	b	a	b
1	6	58	5	64	4	71	1	103
2	14	91	13	98	11	108	5	144
3	25	121	22	129	19	139	11	179
4	36	149	33	157	29	169	19	212
5	48	176	44	185	40	197	27	243
10	115	301	109	313	102	328	79	385
15	188	419	180	433	170	450	140	516

p=.90	α							
	.1		.075		.05		.01	
r	a	b	a	b	a	b	a	b
1	2	28	2	31	1	35		
2	6	44	5	47	4	52	2	70
3	11	58	10	62	8	67	4	87
4	16	72	15	76	13	81	8	102
5	22	84	20	89	18	95	12	117
10	53	144	50	150	47	157	36	185
15	87	200	84	207	79	216	64	247
20	123	255	119	262	113	272	95	307
25	160	308	155	316	148	327	127	365
30	198	361	192	369	185	381	161	422

p=.85	α							
	.1		.075		.05		.01	
r	a	b	a	b	a	b	a	b
1	1	18	1	20	1	22		
2	4	28	3	30	2	33	1	45
3	7	37	6	40	5	43	2	56
4	10	46	9	48	8	52	4	66
5	13	54	12	57	11	61	7	75
10	33	92	31	95	29	100	21	118
15	54	127	52	132	49	137	39	158
20	76	162	74	166	70	173	58	196
25	100	195	96	201	92	208	78	232
30	123	229	119	234	115	242	99	268

p=.80	α							
	.1		.075		.05		.01	
r	a	b	a	b	a	b	a	b
1	1	13						
2	2	20	2	22	1	24		
3	4	27	4	28	3	31	1	40
4	6	33	6	35	5	37	3	47
5	9	39	8	41	7	43	4	54
10	22	66	21	68	19	72	14	85
15	37	91	36	94	33	98	26	113
20	53	115	51	119	48	123	40	140
25	69	139	67	143	64	148	54	166
30	86	163	83	167	80	172	68	191

TABLE P (Continued)

p=.75	α							
	.1		.075		.05		.01	
r	a	b	a	b	a	b	a	b
2	1	16	1	17	1	18		
3	3	20	2	22	2	24	1	31
4	5	25	4	26	3	29	2	36
5	6	29	6	31	5	33	3	41
10	16	50	15	52	14	55	10	65
15	27	69	26	71	24	74	19	86
20	39	87	37	90	35	94	29	106
25	51	105	49	108	47	112	39	126
30	63	123	61	126	59	130	50	145

p=.70	α							
	.1		.075		.05		.01	
r	a	b	a	b	a	b	a	b
2	1	12	1	13				
3	2	16	2	17	1	19		
4	3	20	3	21	2	23	1	29
5	5	23	4	25	3	26	2	33
10	12	39	11	41	10	43	7	51
15	21	54	20	56	18	59	14	68
20	30	69	28	71	27	74	21	84
25	39	83	38	85	36	88	29	100
30	49	97	47	99	45	103	38	115

p=.65	α							
	.1		.075		.05		.01	
r	a	b	a	b	a	b	a	b
2	1	10						
3	1	13	1	14	1	15		
4	2	16	2	17	2	18		
5	3	19	3	20	2	21	1	27
10	9	32	9	33	8	35	5	42
15	16	44	15	45	14	47	10	55
20	23	55	22	57	21	59	16	68
25	30	67	29	69	28	71	22	80
30	38	78	37	80	35	83	29	93

p=.60	α							
	.1		.075		.05		.01	
r	a	b	a	b	a	b	a	b
3	1	11	1	12				
4	2	13	1	14	1	15		
5	3	16	2	16	2	18	1	22
10	7	26	7	27	6	29	4	34
15	13	36	12	37	11	39	8	46
20	18	45	17	47	16	49	12	56
25	24	54	23	56	22	58	17	66
30	30	64	29	65	27	68	23	76

p=.55	α							
	.1		.075		.05		.01	
r	a	b	a	b	a	b	a	b
3	1	9						
4	1	11	1	12	1	13		
5	2	13	2	14	1	15		
10	6	22	5	23	4	24	3	29
15	10	30	9	31	8	32	6	38
20	14	37	14	39	13	40	9	47
25	19	45	18	46	17	48	13	55
30	24	52	23	54	22	56	18	63

TABLE P (Continued)

p=.50	α							
	.1		.075		.05		.01	
r	a	b	a	b	a	b	a	b
4	1	9	1	10				
5	1	11	1	12	1	12		
10	4	18	4	19	3	20	2	24
15	8	25	7	26	6	27	4	32
20	11	31	11	32	10	34	7	39
25	15	37	14	39	13	40	10	46
30	19	44	18	45	17	47	14	53

p=.45	α							
	.1		.075		.05		.01	
r	a	b	a	b	a	b	a	b
5	1	9	1	10				
10	3	15	3	16	2	17	1	21
15	6	21	5	22	5	23	3	27
20	9	26	8	27	8	28	5	33
25	12	31	11	32	10	34	8	39
30	15	36	14	37	13	39	10	44

p=.40	α							
	.1		.075		.05		.01	
r	a	b	a	b	a	b	a	b
5	1	8						
10	2	13	2	13	2	14	1	17
15	4	17	4	18	4	19	2	23
20	7	22	6	23	6	24	4	28
25	9	26	9	27	8	28	6	32
30	12	30	11	31	10	32	8	37

p=.35	α							
	.1		.075		.05		.01	
r	a	b	a	b	a	b	a	b
10	2	11	1	11	1	12		
15	3	14	3	15	3	16	1	19
20	5	18	5	19	4	20	3	23
25	7	21	7	22	6	23	4	27
30	9	25	8	26	8	27	6	31

p=.30	α							
	.1		.075		.05		.01	
r	a	b	a	b	a	b	a	b
10	1	9	1	9	1	10		
15	2	12	2	12	2	13	1	16
20	4	15	3	15	3	16	2	19
25	5	18	5	18	4	19	3	22
30	7	20	6	21	6	22	4	26

p=.25	α							
	.1		.075		.05		.01	
r	a	b	a	b	a	b	a	b
10	1	7						
15	1	10	1	10	1	11		
20	3	12	2	13	2	13	1	16
25	4	14	3	15	3	16	2	18
30	5	16	4	17	4	18	2	21

TABLE P (Continued)

p=.20	α							
	.1		.075		.05		.01	
r	a	b	a	b	a	b	a	b
15	1	8	1	8				
20	2	9	1	10	1	11		
25	2	11	2	12	2	12	1	15
30	3	13	3	13	2	14	1	17

p=.15	α							
	.1		.075		.05		.01	
r	a	b	a	b	a	b	a	b
20	1	7	1	8				
25	1	8	1	9	1	9		
30	2	10	2	10	1	11		

p=.10	α							
	.1		.075		.05		.01	
r	a	b	a	b	a	b	a	b
30	1	7						

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