



**Manchester
Metropolitan
University**

MATHEMATICAL FORMULAE

AND

STATISTICAL TABLES

**Computational Mathematics and Statistics
(6G7V0013_2223_9F)**

Student Version

School of Computing, Mathematics and Digital Technology

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1 Formulae

Algebra

Factors

$$\begin{aligned}a^2 - b^2 &= (a + b)(a - b) \\a^2 \pm 2ab + b^2 &= (a \pm b)^2 \\a^3 \pm b^3 &= (a \pm b)(a^2 \mp ab + b^2)\end{aligned}$$

Quadratic Equations

Given $0 = ax^2 + bx + c$, then

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Indicies

$$\begin{aligned}a^m \times a^n &= a^{m+n} \\ \frac{a^m}{a^n} &= a^{m-n} \\ (a^m)^n &= a^{mn}\end{aligned}$$

Logarithms

Given, $y = a^x$, then

$$x = \log_a(y)$$

Laws of logarithms:

$$\begin{aligned}\log_a(x) + \log_a(y) &= \log_a(xy) \\ \log_a(x) - \log_a(y) &= \log_a\left(\frac{x}{y}\right) \\ \log_a(x^y) &= y \log_a(x)\end{aligned}$$

Change of base rule:

$$\log_a(x) = \frac{\log_b(x)}{\log_b(a)}$$

Combinations and Permutations

$$\begin{aligned}n! &= n(n-1)(n-2) \dots (2)(1) \\ {}^nC_r &= \frac{n!}{r!(n-r)!} \\ {}^nP_r &= \frac{n!}{(n-r)!}\end{aligned}$$

Note that $0! = 1$.

Algebraic Geometry

Equations of a straight line

Line with gradient m and y -intercept c

$$y = mx + c$$

Line with gradient m passing through (x_1, y_1)

$$y - y_1 = m(x - x_1)$$

Line passing through (x_1, y_1) and (x_2, y_2)

Integration by parts

$$\frac{y - y_1}{x - x_1} = \frac{y_2 - y_1}{x_2 - x_1}$$

If u and v are functions of x then

$$\int u \frac{dv}{dx} = uv - \int v \frac{du}{dx} dx$$

Definite integration

$$\int_a^b f(x) dx = \left[\int f(x) dx \right]_a^b \quad \text{where} \quad [f(x)]_a^b = f(b) - f(a)$$

Area under a curve

The area under the curve $y = f(x)$ between $x = x_1$ and $x = x_2$ is

$$\text{area under curve} = \int_{x_1}^{x_2} f(x) dx$$

where $f(x) \geq 0$ for all $x \in [x_1, x_2]$

Mean value of a function

The mean value of the function $y = f(x)$ between $x = x_1$ and $x = x_2$ is

$$\text{mean value} = \frac{1}{x_2 - x_1} \int_{x_1}^{x_2} f(x) dx$$

Series

Arithmetic series

Sum to the first n terms of an arithmetic progression

$$S_n = a + (a + d) + (a + 2d) + \dots + [a + (n - 1)d] = \frac{n}{2} [2a + (n - 1)d]$$

Geometric series

Sum to the first n terms of a geometric progression

$$S_n = a + ar + ar^2 + \dots + ar^{n-1} = \frac{a(1 - r^n)}{1 - r}, \quad r \neq 0$$

If $|r| < 1$, the sum to infinity of a geometric progression

$$S_\infty = \frac{a}{1 - r}$$

Binomial series

$$(1 + x)^n = 1 + nx + \frac{n!}{(n - 1)!2!}x^2 + \dots + \frac{n(n - 1)(n - 2) \dots (a - n + 1)}{n!}x^n$$

Maclaurin series

$$f(x) = f(0) + xf'(0) + \frac{x^2}{2!}f''(0) + \dots + \frac{x^n}{n!}f^{(n)}(0) + \dots$$

Taylor series

$$f(x + h) = f(x) + hf'(x) + \frac{h^2}{2!}f''(x) + \dots + \frac{h^n}{n!}f^{(n)}(x) + \dots$$

Taylor's theorem

$$f(x) = f(a) + (x - a)f'(a) + \dots + \frac{(x - a)^n}{n!}f^{(n)}(a) + R_n$$

where

$$R_n = \frac{(x - a)^{n+1}}{n!}f^{(n+1)}(x_0), \quad x_0 \in (a, x) \text{ (Langrange)}$$

or

$$R_n = (x - a)(x - x_1)^n f^{(n+1)}(x_1), \quad x_1 \in (a, x) \text{ (Cauchy)}$$

Set Theory

For sets A and B :

\overline{A} is the set of elements not in A .

$A \cup B$ is the set of elements in A together with the set of elements in B .

$A \cap B$ is the set of elements in both A and B .

$A - B$ is the set of elements in A but not in B .

Boolean algebra

A Boolean algebra is a set B together with two binary operations $+$ and \cdot such that $\forall a, b, c \in B$

$$\begin{aligned}a + b &= b + a \\a \cdot b &= b \cdot a \\a \cdot (b + c) &= (a \cdot b) + (a \cdot c) \\a + (b \cdot c) &= (a + b) \cdot (a + c)\end{aligned}$$

There exists elements 0 and 1 such that

$$\begin{aligned}a + 0 &= 0 + a = a \\a \cdot 1 &= 1 \cdot a = a\end{aligned}$$

Each element a has a complement a' such that

$$\begin{aligned}a + a' &= a' + a = 1 \\a \cdot a' &= a' \cdot a = 0\end{aligned}$$

De Morgan's laws

$$\begin{aligned}\overline{A \cup B} &= \overline{A} \cap \overline{B} \\ \overline{A \cap B} &= \overline{A} \cup \overline{B}\end{aligned}$$

Probability and Statistics

Probability

- **Probability of an event A**

$$P(A) = \frac{\text{number of elementary events in } A}{\text{number of elementary events in } S}$$

- **Complementary events**

$$\begin{aligned}1) \quad P(A) &= 1 - P(A^c) \quad \text{or} \\ 2) \quad P(A^c) &= 1 - P(A)\end{aligned}$$

- **Independent events**

$$\begin{aligned}1) \quad P(A \cap B) &= P(A) \times P(B) \quad \text{or} \\ 2) \quad P(A | B) &= P(A) \quad \text{or} \\ 3) \quad P(B | A) &= P(B)\end{aligned}$$

- **Conditional probability**

$$1) P(A|B) = \frac{P(A \cap B)}{P(B)} \quad \text{or}$$

$$2) P(B|A) = \frac{P(A \cap B)}{P(A)}$$

- **The addition law of probability**

$$P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

$$P(A \cap B) = P(A)P(B|A)$$

$$P(B_k|A) = \frac{P(B_k)P(A|B_k)}{\sum_i P(B_i)P(A|B_i)}$$

Expectation

Discrete variable:

$$E[g(X)] = \sum_{i=1}^n g(x_i)p(x_i)$$

Continuous variable:

$$E[g(X)] = \int_{-\infty}^{\infty} g(x)f(x)dx$$

$$E(aX + b) = aE(X) + b$$

$$E\left(\sum_{i=1}^n a_i X_i\right) = \sum_{i=1}^n a_i E(X_i)$$

Population Mean

$$\mu = E(X)$$

Population Variance

$$\sigma^2 = V(X) = E[(X - \mu)^2] = E(X^2) - \mu^2$$

$$V(aX + b) = a^2 V(X)$$

For independent variables

$$V\left(\sum_{i=1}^n a_i X_i\right) = \sum_{i=1}^n a_i^2 V(X_i)$$

Estimation from a sample

An unbiased estimate of μ :

$$\bar{x} = \frac{1}{n} \sum_{i=1}^n x_i$$

An unbiased estimate of σ^2 :

$$S^2 = \frac{1}{n-1} \sum_{i=1}^n (x_i - \bar{x})^2 = \frac{1}{n-1} \left[\sum_{i=1}^n x_i^2 - \frac{1}{n} \left(\sum_{i=1}^n x_i \right)^2 \right]$$

For grouped data

$$\bar{x} = \frac{\sum_{i=1}^n f_i x_i}{\sum_{i=1}^n f_i}$$

$$S^2 = \frac{1}{n-1} \left[\sum_{i=1}^n f_i x_i^2 - \frac{\left(\sum_{i=1}^n f_i x_i \right)^2}{\sum_{i=1}^n f_i} \right]$$

Sampling without replacement

$$\text{Variance of sample mean} = \frac{(N-n)\sigma^2}{n(N-1)}$$

Probability Distributions

Distribution	Probability density function	Mean	Variance	MGF
Binomial	$P(r) = {}^n C_r \pi^r (1-\pi)^{n-r}$	$n\pi$	$n\pi(1-\pi)$	$(1-\pi + \pi e^t)^n$
Poisson	$P(r) = \frac{e^{-\mu} \mu^r}{r!}$	μ	μ	$e^{\mu(e^t-1)}$
Modified Geometric	$P(r) = \pi(1-\pi)^{r-1}$	$\frac{1}{\pi}$	$\frac{1-\pi}{\pi^2}$	$\frac{\pi}{1-(1-\pi)e^t}$
Uniform	$f(x) = \frac{1}{b-a}$	$\frac{a+b}{2}$	$\frac{(b-a)^2}{12}$	$\frac{e^{bt} - e^{at}}{(b-a)t}$
Exponential	$f(x) = \mu e^{-\mu x}$	$\frac{1}{\mu}$	$\frac{1}{\mu^2}$	$\frac{\mu}{\mu - t}$
Normal	$f(x) = \frac{1}{\sigma\sqrt{2\pi}} e^{-\frac{(x-\mu)^2}{2\sigma^2}}$	μ	σ^2	$e^{\mu t + \frac{1}{2}\sigma^2 t^2}$
Chi-squared	$f(x) = \frac{1}{2^{\nu/2} \Gamma\left(\frac{\nu}{2}\right)} x^{\nu/2-1} e^{-x/2}$	ν	2ν	$(1-2t)^{-\nu/2}$

Distribution of sample statistics

For a random sample from a Normal distribution

$$\begin{aligned} \frac{\bar{x} - \mu}{\sigma/\sqrt{n}} & \text{ is an observation from } N(0, 1) \\ \frac{\bar{x} - \mu}{s/\sqrt{n}} & \text{ is an observation from } t_{n-1} \\ \frac{\sum_{i=1}^n (x_i - \bar{x})^2}{\sigma^2} & \text{ is an observation from } \chi_{n-1}^2 \end{aligned}$$

If x_1, x_2, \dots, x_n is a random sample from $N(\mu_x, \sigma^2)$ and y_1, y_2, \dots, y_m is a second independent random sample from $N(\mu_y, \sigma^2)$ then S_x^2/S_y^2 is an observation from $F_{(n-1, m-1)}$,

$$\frac{\bar{x} - \bar{y} - (\mu_x - \mu_y)}{S_P \sqrt{\frac{1}{n} + \frac{1}{m}}} \text{ is an observation from } t_{m+n-2}$$

where

$$S_P^2 = \frac{(n-1)S_x^2 + (m-1)S_y^2}{n+m-2}$$

$\sum \frac{(O - E)^2}{E}$ is distributed approximately as χ^2 .

Correlation

Product moment correlation coefficient, ρ , is estimated by

$$\rho = \frac{\sum_{i=1}^n (x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum_{i=1}^n (x_i - \bar{x})^2 \sum_{i=1}^n (y_i - \bar{y})^2}} = \frac{\left(\sum_{i=1}^n x_i y_i \right) - n\bar{x}\bar{y}}{\sqrt{\left(\sum_{i=1}^n x_i^2 - n\bar{x}^2 \right) \left(\sum_{i=1}^n y_i^2 - n\bar{y}^2 \right)}}$$

Spearman's rank correlation coefficient, ρ_s , is estimated by

$$\rho_s = 1 - \frac{6 \sum_{i=1}^n d_i^2}{n(n^2 - 1)}$$

If $\rho_s = 0$ and $n \geq 10$ then $\rho_s \sqrt{\frac{n-2}{1-\rho_s^2}}$ is approximately distributed as t_{n-2} .

Regression

Model $y = \alpha + \beta x + \epsilon$ where ϵ is $N(0, \sigma^2)$

$$b = \frac{\sum_{i=1}^n x_i y_i - \frac{1}{n} \left(\sum_{i=1}^n x_i \sum_{i=1}^n y_i \right)}{\sum_{i=1}^n x_i^2 - \frac{1}{n} \left(\sum_{i=1}^n x_i \right)^2}; \quad \bar{y} = a + b\bar{x}$$

$$E(a) = \alpha, \quad V(a) = \frac{\sigma^2 \sum_{i=1}^n x_i^2}{n \sum_{i=1}^n (x_i - \bar{x})^2}$$

$$E(b) = \beta, \quad V(b) = \frac{\sigma^2}{\sum_{i=1}^n (x_i - \bar{x})^2}$$

$$E \left[\sum_{i=1}^n (y_i - a - bx_i)^2 \right] = (n-2)\sigma^2$$

$\frac{\sum_{i=1}^n (y_i - a - bx_i)^2}{\sigma^2}$ is distributed as χ_{n-2}^2

$$\begin{aligned} \sum_{i=1}^n (y_i - a - bx_i)^2 &= \sum_{i=1}^n y_i^2 - a \sum_{i=1}^n y_i - b \sum_{i=1}^n x_i y_i \\ \sum_{i=1}^n (y_i - \bar{y})^2 &= b^2 \sum_{i=1}^n (x_i - \bar{x})^2 + \sum_{i=1}^n (y_i - a - bx_i)^2 \end{aligned}$$

100(1 - α)% confidence interval for mean value of y at $x = x_0$

$$a + bx_0 \pm t_{n-2, \alpha/2} \sqrt{\frac{1}{n} + \frac{(x_0 - \bar{x})^2}{\sum_{i=1}^n (x_i - \bar{x})^2}}$$

100(1 - α)% prediction interval for mean value of y at $x = x_0$

$$a + bx_0 \pm t_{n-2, \alpha/2} \sqrt{1 + \frac{1}{n} + \frac{(x_0 - \bar{x})^2}{\sum_{i=1}^n (x_i - \bar{x})^2}}$$

One-way ANOVA table for a simple linear regression model

The analysis of variance is displayed in a table in the following standard format,

Source	DF	SS	MS = SS / DF
Regression on x	1	$SS_R = b^2 \left[\sum_{i=1}^n x_i^2 - \frac{1}{n} \left(\sum_{i=1}^n x_i \right)^2 \right]$	$SS_R/1$
Error	$n - 2$	SS_E (by subtraction)	$SS_E/(n - 2)$
Total	$n - 1$	$SS_T = \sum_{i=1}^n y_i^2 - \frac{1}{n} \left(\sum_{i=1}^n y_i \right)^2$	

Multiple Regression

To fit $y = a + bx + ct$

$$\begin{aligned}
 0 &= \sum_{i=1}^n y_i - na - b \sum_{i=1}^n x_i - c \sum_{i=1}^n t_i \\
 0 &= \sum_{i=1}^n x_i y_i - a \sum_{i=1}^n x_i - b \sum_{i=1}^n x_i^2 - c \sum_{i=1}^n x_i t_i \\
 0 &= \sum_{i=1}^n t_i y_i - a \sum_{i=1}^n t_i - b \sum_{i=1}^n x_i t_i - c \sum_{i=1}^n t_i^2
 \end{aligned}$$

One-way ANOVA table for a simple randomised design

The analysis of variance is displayed in a table in the following standard format,

Source	DF	SS	MS=SS/DF
Treatments	$t - 1$	$SS_{Tr} = \sum_{i=1}^t \frac{T_i^2}{n_i} - \frac{G^2}{N}$	$SS_{Tr}/(t - 1)$
Error	$N - t$	SS_E (by subtraction)	$SS_E/(N - t)$
Total	$N - 1$	$SS_T = \sum_{i=1}^t \sum_{j=1}^{n_i} y_{ij}^2 - \frac{G^2}{N}$	

where t is the number of treatments, N is the number of observations, T_i is the total of the observations for the i th treatment and G is the total of all observations.

Two-way ANOVA table for a randomised block experimental design

The analysis of variance is displayed in a table in the following standard format,

Source	DF	SS	MS = SS / DF
Treatments	$t - 1$	$SS_{tr} = \sum_{i=1}^t \frac{T_i^2}{b} - \frac{G^2}{bt}$	$SS_{tr}/(t - 1)$
Blocks	$b - 1$	$SS_B = \sum_{j=1}^b \frac{B_j^2}{t} - \frac{G^2}{bt}$	$SS_B/(b - 1)$
Error	$(b - 1)(t - 1)$	SS_E (by subtraction)	$SS_E/(b - 1)(t - 1)$
Total	$bt - 1$	$SS_T = \sum_{i=1}^t \sum_{j=1}^b y_{ij}^2 - \frac{G^2}{bt}$	

where t is the number of treatments, b is the number of blocks and T_i, B_j , are the treatment totals and block totals respectively.

ANOVA table for a Latin Square experimental design

Source	DF	SS	MS = SS / DF
Rows	$t - 1$	$SS_R = \sum_{j=1}^t \frac{R_j^2}{t} - \frac{G^2}{t^2}$	$SS_R/(t - 1)$
Columns	$t - 1$	$SS_C = \sum_{i=1}^t \frac{C_i^2}{t} - \frac{G^2}{t^2}$	$SS_C/(t - 1)$
Treatments	$t - 1$	$SS_{Tr} = \sum_{k=1}^t \frac{T_k^2}{t} - \frac{G^2}{t^2}$	$SS_{Tr}/(t - 1)$
Error	$(t - 1)(t - 2)$	SS_E (by subtraction)	$SS_E/(t - 1)(t - 2)$
Total	$t^2 - 1$	$SS_T = \sum_{i=1}^t \sum_{j=1}^t y_{ij}^2 - \frac{G^2}{t^2}$	

where t is the number of treatments, C_i, R_j, T_k are the row totals, column totals and treatment totals respectively.

2 Statistical Tables

The following pages contain statistical tables that have been calculated and may be freely copied and used for teaching purposes. For further details of the probability distributions see page 6.

Table	Page(s)
Binomial Distribution	15 – 22
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F Distribution	36 – 41
χ^2 Distribution	42 – 43
Pearson's Product Moment Correlation Coefficient	44
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Random digits	49
Random observations from $N(0, 1)$	50

Distributions

a. Binomial distribution

$X \sim \text{Bi}(n, p)$

$$P(X = x) = C_x^n p^x (1 - p)^{n-x} \quad , \text{ for } x = 0, 1, 2, \dots, n$$

where

$$C_x^n = \frac{n!}{x!(n-x)!} \quad \text{combinations}$$

Using Binomial tables

- $P(X \leq x)$ found directly from tables
- $P(X \geq x) = 1 - P(X \leq x - 1)$
- $P(X = x) = P(X \leq x) - P(X \leq x - 1)$

$$P(a \leq X \leq b) = P(X \leq b) - P(X \leq a - 1)$$

b. Poisson distribution
 $X \sim \text{Pois}(\mu)$

$$P(X = x) = \frac{\mu^x e^{-\mu}}{x!}, \quad x = 0, 1, 2, 3, \dots$$

Using Poisson tables

- $P(X \leq x)$ found directly from tables
- $P(X \geq x) = 1 - P(X \leq x-1)$
- $P(X = x) = P(X \leq x) - P(X \leq x-1)$
- $P(a \leq X \leq b) = P(X \leq b) - P(X \leq a-1)$

c. Normal distribution

$$X \sim N(\mu, \sigma^2)$$

- **The Standard Normal**

$$Z \sim N(0,1)$$

$$Z = \frac{X - \mu}{\sigma}, \quad \text{or} \quad X = \sigma Z + \mu$$

RULES

- $P(Z > +a)$ found directly from tables
- $P(Z < +a) = 1 - P(Z > +a)$
- $P(a < Z < b) = P(Z \geq a) - P(Z \geq b)$
- $P(Z < -a) = P(Z > +a)$
- $P(Z > -a) = 1 - P(Z > +a)$

- **Distribution of a sample mean**

$$\bar{X} \sim N\left(\mu, \frac{\sigma^2}{n}\right), \quad \text{standard error} = \frac{\sigma}{\sqrt{n}}$$

- **Confidence intervals - population standard deviation known (σ known)**

$$\mu = \bar{X} \pm z_{\frac{1}{2}\alpha} \frac{\sigma}{\sqrt{n}}$$

- **Confidence intervals - population standard deviation unknown (σ unknown)**

$$\mu = \bar{X} \pm t_{\frac{1}{2}\alpha, n-1} \frac{s}{\sqrt{n}}$$

Hypothesis tests for a Normal mean

a. Z-test

$$Z = \frac{\bar{x} - \mu_0}{\frac{\sigma}{\sqrt{n}}}$$

Alternative hypothesis, H_1	Reject H_0 if
$H_1: \mu \neq \mu_0$	$ Z > z_{\frac{1}{2}\alpha}$
$H_1: \mu > \mu_0$	$Z > z_\alpha$
$H_1: \mu < \mu_0$	$Z < -z_\alpha$

b. t-test

$$t = \frac{\bar{x} - \mu_0}{\frac{s}{\sqrt{n}}}$$

Alternative hypothesis H_1	Reject H_0 if
$H_1: \mu > \mu_0$	$T > t_\alpha$
$H_1: \mu < \mu_0$	$T < -t_\alpha$
$H_1: \mu \neq \mu_0$	$ T > t_{\frac{1}{2}\alpha}$

2.1 Binomial Distribution

Tabulated values of $P(X \leq x)$ where $X \sim \text{Binomial}(n, \pi)$

n = 2			n = 5					
π	0	1	π	0	1	2	3	4
0.01	0.9801	0.9999	0.01	0.9510	0.9990			
0.02	0.9604	0.9996	0.02	0.9039	0.9962	0.9999		
0.03	0.9409	0.9991	0.03	0.8587	0.9915	0.9997		
0.04	0.9216	0.9984	0.04	0.8154	0.9852	0.9994		
0.05	0.9025	0.9975	0.05	0.7738	0.9774	0.9988		
0.06	0.8836	0.9964	0.06	0.7339	0.9681	0.9980	0.9999	
0.07	0.8649	0.9951	0.07	0.6957	0.9575	0.9969	0.9999	
0.08	0.8464	0.9936	0.08	0.6591	0.9456	0.9955	0.9998	
0.09	0.8281	0.9919	0.09	0.6240	0.9326	0.9937	0.9997	
0.10	0.8100	0.9900	0.10	0.5905	0.9185	0.9914	0.9995	
0.11	0.7921	0.9879	0.11	0.5584	0.9035	0.9888	0.9993	
0.12	0.7744	0.9856	0.12	0.5277	0.8875	0.9857	0.9991	
0.13	0.7569	0.9831	0.13	0.4984	0.8708	0.9821	0.9987	
0.14	0.7396	0.9804	0.14	0.4704	0.8533	0.9780	0.9983	0.9999
0.15	0.7225	0.9775	0.15	0.4437	0.8352	0.9734	0.9978	0.9999
0.16	0.7056	0.9744	0.16	0.4182	0.8165	0.9682	0.9971	0.9999
0.17	0.6889	0.9711	0.17	0.3939	0.7973	0.9625	0.9964	0.9999
0.18	0.6724	0.9676	0.18	0.3707	0.7776	0.9563	0.9955	0.9998
0.19	0.6561	0.9639	0.19	0.3487	0.7576	0.9495	0.9945	0.9998
0.20	0.6400	0.9600	0.20	0.3277	0.7373	0.9421	0.9933	0.9997
0.21	0.6241	0.9559	0.21	0.3077	0.7167	0.9341	0.9919	0.9996
0.22	0.6084	0.9516	0.22	0.2887	0.6959	0.9256	0.9903	0.9995
0.23	0.5929	0.9471	0.23	0.2707	0.6749	0.9164	0.9886	0.9994
0.24	0.5776	0.9424	0.24	0.2536	0.6539	0.9067	0.9866	0.9992
0.25	0.5625	0.9375	0.25	0.2373	0.6328	0.8965	0.9844	0.9990
0.26	0.5476	0.9324	0.26	0.2219	0.6117	0.8857	0.9819	0.9988
0.27	0.5329	0.9271	0.27	0.2073	0.5907	0.8743	0.9792	0.9986
0.28	0.5184	0.9216	0.28	0.1935	0.5697	0.8624	0.9762	0.9983
0.29	0.5041	0.9159	0.29	0.1804	0.5489	0.8499	0.9728	0.9979
0.30	0.4900	0.9100	0.30	0.1681	0.5282	0.8369	0.9692	0.9976
0.31	0.4761	0.9039	0.31	0.1564	0.5077	0.8234	0.9653	0.9971
0.32	0.4624	0.8976	0.32	0.1454	0.4875	0.8095	0.9610	0.9966
0.33	0.4489	0.8911	0.33	0.1350	0.4675	0.7950	0.9564	0.9961
0.34	0.4356	0.8844	0.34	0.1252	0.4478	0.7801	0.9514	0.9955
0.35	0.4225	0.8775	0.35	0.1160	0.4284	0.7648	0.9460	0.9947
0.36	0.4096	0.8704	0.36	0.1074	0.4094	0.7491	0.9402	0.9940
0.37	0.3969	0.8631	0.37	0.0992	0.3907	0.7330	0.9340	0.9931
0.38	0.3844	0.8556	0.38	0.0916	0.3724	0.7165	0.9274	0.9921
0.39	0.3721	0.8479	0.39	0.0845	0.3545	0.6997	0.9204	0.9910
0.40	0.3600	0.8400	0.40	0.0778	0.3370	0.6826	0.9130	0.9898
0.41	0.3481	0.8319	0.41	0.0715	0.3199	0.6651	0.9051	0.9884
0.42	0.3364	0.8236	0.42	0.0656	0.3033	0.6475	0.8967	0.9869
0.43	0.3249	0.8151	0.43	0.0602	0.2871	0.6295	0.8879	0.9853
0.44	0.3136	0.8064	0.44	0.0551	0.2714	0.6114	0.8786	0.9835
0.45	0.3025	0.7975	0.45	0.0503	0.2562	0.5931	0.8688	0.9815
0.46	0.2916	0.7884	0.46	0.0459	0.2415	0.5747	0.8585	0.9794
0.47	0.2809	0.7791	0.47	0.0418	0.2272	0.5561	0.8478	0.9771
0.48	0.2704	0.7696	0.48	0.0380	0.2135	0.5375	0.8365	0.9745
0.49	0.2601	0.7599	0.49	0.0345	0.2002	0.5187	0.8248	0.9718
0.50	0.2500	0.7500	0.50	0.0313	0.1875	0.5000	0.8125	0.9688

n = 10										
π	0	1	2	3	4	5	6	7	8	9
0.01	0.9044	0.9957	0.9999							
0.02	0.8171	0.9838	0.9991							
0.03	0.7374	0.9655	0.9972	0.9999						
0.04	0.6648	0.9418	0.9938	0.9996						
0.05	0.5987	0.9139	0.9885	0.9990	0.9999					
0.06	0.5386	0.8824	0.9812	0.9980	0.9998					
0.07	0.4840	0.8483	0.9717	0.9964	0.9997					
0.08	0.4344	0.8121	0.9599	0.9942	0.9994					
0.09	0.3894	0.7746	0.9460	0.9912	0.9990	0.9999				
0.10	0.3487	0.7361	0.9298	0.9872	0.9984	0.9999				
0.11	0.3118	0.6972	0.9116	0.9822	0.9975	0.9997				
0.12	0.2785	0.6583	0.8913	0.9761	0.9963	0.9996				
0.13	0.2484	0.6196	0.8692	0.9687	0.9947	0.9994	0.9999			
0.14	0.2213	0.5816	0.8455	0.9600	0.9927	0.9990	0.9999			
0.15	0.1969	0.5443	0.8202	0.9500	0.9901	0.9986	0.9999			
0.16	0.1749	0.5080	0.7936	0.9386	0.9870	0.9980	0.9998			
0.17	0.1552	0.4730	0.7659	0.9259	0.9832	0.9973	0.9997			
0.18	0.1374	0.4392	0.7372	0.9117	0.9787	0.9963	0.9996			
0.19	0.1216	0.4068	0.7078	0.8961	0.9734	0.9951	0.9994	0.9999		
0.20	0.1074	0.3758	0.6778	0.8791	0.9672	0.9936	0.9991	0.9999		
0.21	0.0947	0.3464	0.6474	0.8609	0.9601	0.9918	0.9988	0.9999		
0.22	0.0834	0.3185	0.6169	0.8413	0.9521	0.9896	0.9984	0.9998		
0.23	0.0733	0.2921	0.5863	0.8206	0.9431	0.9870	0.9979	0.9998		
0.24	0.0643	0.2673	0.5558	0.7988	0.9330	0.9839	0.9973	0.9997		
0.25	0.0563	0.2440	0.5256	0.7759	0.9219	0.9803	0.9965	0.9996		
0.26	0.0492	0.2222	0.4958	0.7521	0.9096	0.9761	0.9955	0.9994		
0.27	0.0430	0.2019	0.4665	0.7274	0.8963	0.9713	0.9944	0.9993	0.9999	
0.28	0.0374	0.1830	0.4378	0.7021	0.8819	0.9658	0.9930	0.9990	0.9999	
0.29	0.0326	0.1655	0.4099	0.6761	0.8663	0.9596	0.9913	0.9988	0.9999	
0.30	0.0282	0.1493	0.3828	0.6496	0.8497	0.9527	0.9894	0.9984	0.9999	
0.31	0.0245	0.1344	0.3566	0.6228	0.8321	0.9449	0.9871	0.9980	0.9998	
0.32	0.0211	0.1206	0.3313	0.5956	0.8133	0.9363	0.9845	0.9975	0.9997	
0.33	0.0182	0.1080	0.3070	0.5684	0.7936	0.9268	0.9815	0.9968	0.9997	
0.34	0.0157	0.0965	0.2838	0.5411	0.7730	0.9164	0.9780	0.9961	0.9996	
0.35	0.0135	0.0860	0.2616	0.5138	0.7515	0.9051	0.9740	0.9952	0.9995	
0.36	0.0115	0.0764	0.2405	0.4868	0.7292	0.8928	0.9695	0.9941	0.9993	
0.37	0.0098	0.0677	0.2206	0.4600	0.7061	0.8795	0.9644	0.9929	0.9991	
0.38	0.0084	0.0598	0.2017	0.4336	0.6823	0.8652	0.9587	0.9914	0.9989	0.9999
0.39	0.0071	0.0527	0.1840	0.4077	0.6580	0.8500	0.9523	0.9897	0.9986	0.9999
0.40	0.0060	0.0464	0.1673	0.3823	0.6331	0.8338	0.9452	0.9877	0.9983	0.9999
0.41	0.0051	0.0406	0.1517	0.3575	0.6078	0.8166	0.9374	0.9854	0.9979	0.9999
0.42	0.0043	0.0355	0.1372	0.3335	0.5822	0.7984	0.9288	0.9828	0.9975	0.9998
0.43	0.0036	0.0309	0.1236	0.3102	0.5564	0.7793	0.9194	0.9798	0.9969	0.9998
0.44	0.0030	0.0269	0.1111	0.2877	0.5304	0.7593	0.9092	0.9764	0.9963	0.9997
0.45	0.0025	0.0233	0.0996	0.2660	0.5044	0.7384	0.8980	0.9726	0.9955	0.9997
0.46	0.0021	0.0201	0.0889	0.2453	0.4784	0.7168	0.8859	0.9683	0.9946	0.9996
0.47	0.0017	0.0173	0.0791	0.2255	0.4526	0.6943	0.8729	0.9634	0.9935	0.9995
0.48	0.0014	0.0148	0.0702	0.2067	0.4270	0.6712	0.8590	0.9580	0.9923	0.9994
0.49	0.0012	0.0126	0.0621	0.1888	0.4018	0.6474	0.8440	0.9520	0.9909	0.9992
0.50	0.0010	0.0107	0.0547	0.1719	0.3770	0.6230	0.8281	0.9453	0.9893	0.9990

n = 20										
π	0	1	2	3	4	5	6	7	8	9
0.01	0.8179	0.9831	0.9990							
0.02	0.6676	0.9401	0.9929	0.9994						
0.03	0.5438	0.8802	0.9790	0.9973	0.9997					
0.04	0.4420	0.8103	0.9561	0.9926	0.9990	0.9999				
0.05	0.3585	0.7358	0.9245	0.9841	0.9974	0.9997				
0.06	0.2901	0.6605	0.8850	0.9710	0.9944	0.9991	0.9999			
0.07	0.2342	0.5869	0.8390	0.9529	0.9893	0.9981	0.9997			
0.08	0.1887	0.5169	0.7879	0.9294	0.9817	0.9962	0.9994	0.9999		
0.09	0.1516	0.4516	0.7334	0.9007	0.9710	0.9932	0.9987	0.9998		
0.10	0.1216	0.3917	0.6769	0.8670	0.9568	0.9887	0.9976	0.9996	0.9999	
0.11	0.0972	0.3376	0.6198	0.8290	0.9390	0.9825	0.9959	0.9992	0.9999	
0.12	0.0776	0.2891	0.5631	0.7873	0.9173	0.9740	0.9933	0.9986	0.9998	
0.13	0.0617	0.2461	0.5080	0.7427	0.8917	0.9630	0.9897	0.9976	0.9995	0.9999
0.14	0.0490	0.2084	0.4550	0.6959	0.8625	0.9493	0.9847	0.9962	0.9992	0.9999
0.15	0.0388	0.1756	0.4049	0.6477	0.8298	0.9327	0.9781	0.9941	0.9987	0.9998
0.16	0.0306	0.1471	0.3580	0.5990	0.7941	0.9130	0.9696	0.9912	0.9979	0.9996
0.17	0.0241	0.1227	0.3146	0.5504	0.7557	0.8902	0.9591	0.9873	0.9967	0.9993
0.18	0.0189	0.1018	0.2748	0.5026	0.7151	0.8644	0.9463	0.9823	0.9951	0.9989
0.19	0.0148	0.0841	0.2386	0.4561	0.6729	0.8357	0.9311	0.9759	0.9929	0.9983
0.20	0.0115	0.0692	0.2061	0.4114	0.6296	0.8042	0.9133	0.9679	0.9900	0.9974
0.21	0.0090	0.0566	0.1770	0.3690	0.5858	0.7703	0.8929	0.9581	0.9862	0.9962
0.22	0.0069	0.0461	0.1512	0.3289	0.5420	0.7343	0.8699	0.9464	0.9814	0.9946
0.23	0.0054	0.0374	0.1284	0.2915	0.4986	0.6965	0.8443	0.9325	0.9754	0.9925
0.24	0.0041	0.0302	0.1085	0.2569	0.4561	0.6573	0.8162	0.9165	0.9680	0.9897
0.25	0.0032	0.0243	0.0913	0.2252	0.4148	0.6172	0.7858	0.8982	0.9591	0.9861
0.26	0.0024	0.0195	0.0763	0.1962	0.3752	0.5765	0.7533	0.8775	0.9485	0.9817
0.27	0.0018	0.0155	0.0635	0.1700	0.3375	0.5357	0.7190	0.8545	0.9360	0.9762
0.28	0.0014	0.0123	0.0526	0.1466	0.3019	0.4952	0.6831	0.8293	0.9216	0.9695
0.29	0.0011	0.0097	0.0433	0.1256	0.2685	0.4553	0.6460	0.8018	0.9052	0.9615
0.30	0.0008	0.0076	0.0355	0.1071	0.2375	0.4164	0.6080	0.7723	0.8867	0.9520
0.31	0.0006	0.0060	0.0289	0.0908	0.2089	0.3787	0.5695	0.7409	0.8660	0.9409
0.32	0.0004	0.0047	0.0235	0.0765	0.1827	0.3426	0.5307	0.7078	0.8432	0.9281
0.33	0.0003	0.0036	0.0189	0.0642	0.1589	0.3083	0.4921	0.6732	0.8182	0.9134
0.34	0.0002	0.0028	0.0152	0.0535	0.1374	0.2758	0.4540	0.6376	0.7913	0.8968
0.35	0.0002	0.0021	0.0121	0.0444	0.1182	0.2454	0.4166	0.6010	0.7624	0.8782
0.36	0.0001	0.0016	0.0096	0.0366	0.1011	0.2171	0.3803	0.5639	0.7317	0.8576
0.37	0.0001	0.0012	0.0076	0.0300	0.0859	0.1910	0.3453	0.5265	0.6995	0.8350
0.38	0.0001	0.0009	0.0060	0.0245	0.0726	0.1671	0.3118	0.4892	0.6659	0.8103
0.39	0.0001	0.0007	0.0047	0.0198	0.0610	0.1453	0.2800	0.4522	0.6312	0.7837
0.40	0.0000	0.0005	0.0036	0.0160	0.0510	0.1256	0.2500	0.4159	0.5956	0.7553
0.41	0.0000	0.0004	0.0028	0.0128	0.0423	0.1079	0.2220	0.3804	0.5594	0.7252
0.42	0.0000	0.0003	0.0021	0.0102	0.0349	0.0922	0.1959	0.3461	0.5229	0.6936
0.43	0.0000	0.0002	0.0016	0.0080	0.0286	0.0783	0.1719	0.3132	0.4864	0.6606
0.44	0.0000	0.0002	0.0012	0.0063	0.0233	0.0660	0.1499	0.2817	0.4501	0.6264
0.45	0.0000	0.0001	0.0009	0.0049	0.0189	0.0553	0.1299	0.2520	0.4143	0.5914
0.46	0.0000	0.0001	0.0007	0.0038	0.0152	0.0461	0.1119	0.2241	0.3793	0.5557
0.47	0.0000	0.0001	0.0005	0.0029	0.0121	0.0381	0.0958	0.1980	0.3454	0.5196
0.48	0.0000	0.0000	0.0004	0.0023	0.0096	0.0313	0.0814	0.1739	0.3127	0.4834
0.49	0.0000	0.0000	0.0003	0.0017	0.0076	0.0255	0.0688	0.1518	0.2814	0.4475
0.50	0.0000	0.0000	0.0002	0.0013	0.0059	0.0207	0.0577	0.1316	0.2517	0.4119

n = 20								
π	10	11	12	13	14	15	16	17
0.01								
0.02								
0.03								
0.04								
0.05								
0.06								
0.07								
0.08								
0.09								
0.10								
0.11								
0.12								
0.13								
0.14								
0.15								
0.16	0.9999							
0.17	0.9999							
0.18	0.9998							
0.19	0.9996	0.9999						
0.20	0.9994	0.9999						
0.21	0.9991	0.9998						
0.22	0.9987	0.9997						
0.23	0.9981	0.9996	0.9999					
0.24	0.9972	0.9994	0.9999					
0.25	0.9961	0.9991	0.9998					
0.26	0.9945	0.9986	0.9997					
0.27	0.9926	0.9981	0.9996	0.9999				
0.28	0.9900	0.9973	0.9994	0.9999				
0.29	0.9868	0.9962	0.9991	0.9998				
0.30	0.9829	0.9949	0.9987	0.9997				
0.31	0.9780	0.9931	0.9982	0.9996	0.9999			
0.32	0.9721	0.9909	0.9975	0.9994	0.9999			
0.33	0.9650	0.9881	0.9966	0.9992	0.9999			
0.34	0.9566	0.9846	0.9955	0.9989	0.9998			
0.35	0.9468	0.9804	0.9940	0.9985	0.9997			
0.36	0.9355	0.9753	0.9921	0.9979	0.9996	0.9999		
0.37	0.9225	0.9692	0.9898	0.9972	0.9994	0.9999		
0.38	0.9077	0.9619	0.9868	0.9963	0.9991	0.9998		
0.39	0.8910	0.9534	0.9833	0.9951	0.9988	0.9998		
0.40	0.8725	0.9435	0.9790	0.9935	0.9984	0.9997		
0.41	0.8520	0.9321	0.9738	0.9916	0.9978	0.9996	0.9999	
0.42	0.8295	0.9190	0.9676	0.9893	0.9971	0.9994	0.9999	
0.43	0.8051	0.9042	0.9603	0.9864	0.9962	0.9992	0.9999	
0.44	0.7788	0.8877	0.9518	0.9828	0.9950	0.9989	0.9998	
0.45	0.7507	0.8692	0.9420	0.9786	0.9936	0.9985	0.9997	
0.46	0.7209	0.8489	0.9306	0.9735	0.9917	0.9980	0.9996	0.9999
0.47	0.6896	0.8266	0.9177	0.9674	0.9895	0.9973	0.9995	0.9999
0.48	0.6568	0.8023	0.9031	0.9603	0.9867	0.9965	0.9993	0.9999
0.49	0.6229	0.7762	0.8867	0.9520	0.9834	0.9954	0.9990	0.9999
0.50	0.5881	0.7483	0.8684	0.9423	0.9793	0.9941	0.9987	0.9998

n = 50										
π	0	1	2	3	4	5	6	7	8	9
0.01	0.6050	0.9106	0.9862	0.9984	0.9999					
0.02	0.3642	0.7358	0.9216	0.9822	0.9968	0.9995	0.9999			
0.03	0.2181	0.5553	0.8108	0.9372	0.9832	0.9963	0.9993	0.9999		
0.04	0.1299	0.4005	0.6767	0.8609	0.9510	0.9856	0.9964	0.9992	0.9999	
0.05	0.0769	0.2794	0.5405	0.7604	0.8964	0.9622	0.9882	0.9968	0.9992	0.9998
0.06	0.0453	0.1900	0.4162	0.6473	0.8206	0.9224	0.9711	0.9906	0.9973	0.9993
0.07	0.0266	0.1265	0.3108	0.5327	0.7290	0.8650	0.9417	0.9780	0.9927	0.9978
0.08	0.0155	0.0827	0.2260	0.4253	0.6290	0.7919	0.8981	0.9562	0.9833	0.9944
0.09	0.0090	0.0532	0.1605	0.3303	0.5277	0.7072	0.8404	0.9232	0.9672	0.9875
0.10	0.0052	0.0338	0.1117	0.2503	0.4312	0.6161	0.7702	0.8779	0.9421	0.9755
0.11	0.0029	0.0212	0.0763	0.1854	0.3438	0.5240	0.6909	0.8207	0.9068	0.9565
0.12	0.0017	0.0131	0.0513	0.1345	0.2680	0.4353	0.6065	0.7533	0.8608	0.9292
0.13	0.0009	0.0080	0.0339	0.0958	0.2044	0.3537	0.5211	0.6783	0.8045	0.8926
0.14	0.0005	0.0049	0.0221	0.0670	0.1528	0.2814	0.4384	0.5990	0.7395	0.8463
0.15	0.0003	0.0029	0.0142	0.0460	0.1121	0.2194	0.3613	0.5188	0.6681	0.7911
0.16	0.0002	0.0017	0.0090	0.0312	0.0808	0.1677	0.2919	0.4406	0.5929	0.7282
0.17	0.0001	0.0010	0.0056	0.0208	0.0572	0.1259	0.2314	0.3672	0.5168	0.6597
0.18	0.0000	0.0006	0.0035	0.0137	0.0399	0.0929	0.1801	0.3004	0.4424	0.5878
0.19	0.0000	0.0003	0.0021	0.0088	0.0274	0.0673	0.1376	0.2413	0.3720	0.5151
0.20	0.0000	0.0002	0.0013	0.0057	0.0185	0.0480	0.1034	0.1904	0.3073	0.4437
0.21	0.0000	0.0001	0.0008	0.0036	0.0123	0.0337	0.0764	0.1477	0.2495	0.3759
0.22	0.0000	0.0001	0.0005	0.0022	0.0081	0.0233	0.0555	0.1126	0.1991	0.3130
0.23	0.0000	0.0000	0.0003	0.0014	0.0052	0.0159	0.0397	0.0844	0.1563	0.2564
0.24	0.0000	0.0000	0.0002	0.0008	0.0033	0.0107	0.0280	0.0623	0.1206	0.2066
0.25	0.0000	0.0000	0.0001	0.0005	0.0021	0.0070	0.0194	0.0453	0.0916	0.1637
0.26	0.0000	0.0000	0.0000	0.0003	0.0013	0.0046	0.0132	0.0324	0.0684	0.1276
0.27	0.0000	0.0000	0.0000	0.0002	0.0008	0.0030	0.0089	0.0228	0.0503	0.0979
0.28	0.0000	0.0000	0.0000	0.0001	0.0005	0.0019	0.0059	0.0158	0.0365	0.0740
0.29	0.0000	0.0000	0.0000	0.0001	0.0003	0.0012	0.0039	0.0108	0.0260	0.0550
0.30	0.0000	0.0000	0.0000	0.0000	0.0002	0.0007	0.0025	0.0073	0.0183	0.0402
0.31	0.0000	0.0000	0.0000	0.0000	0.0001	0.0004	0.0016	0.0048	0.0126	0.0290
0.32	0.0000	0.0000	0.0000	0.0000	0.0001	0.0003	0.0010	0.0031	0.0086	0.0206
0.33	0.0000	0.0000	0.0000	0.0000	0.0000	0.0002	0.0006	0.0020	0.0058	0.0144
0.34	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0004	0.0013	0.0038	0.0099
0.35	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0002	0.0008	0.0025	0.0067
0.36	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0005	0.0016	0.0045
0.37	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0003	0.0010	0.0029
0.38	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0002	0.0006	0.0019
0.39	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0004	0.0012
0.40	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0002	0.0008
0.41	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0005
0.42	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0003
0.43	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0002
0.44	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001
0.45	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001
0.46	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.47	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.48	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.49	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.50	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

n = 50										
π	10	11	12	13	14	15	16	17	18	19
0.01										
0.02										
0.03										
0.04										
0.05										
0.06	0.9998									
0.07	0.9994	0.9999								
0.08	0.9983	0.9995	0.9999							
0.09	0.9957	0.9987	0.9996	0.9999						
0.10	0.9906	0.9968	0.9990	0.9997	0.9999					
0.11	0.9817	0.9931	0.9976	0.9992	0.9998	0.9999				
0.12	0.9675	0.9865	0.9949	0.9982	0.9994	0.9998				
0.13	0.9465	0.9758	0.9900	0.9963	0.9987	0.9996	0.9999			
0.14	0.9176	0.9598	0.9821	0.9927	0.9973	0.9991	0.9997	0.9999		
0.15	0.8801	0.9372	0.9699	0.9868	0.9947	0.9981	0.9993	0.9998	0.9999	
0.16	0.8339	0.9071	0.9525	0.9777	0.9904	0.9962	0.9986	0.9995	0.9999	
0.17	0.7797	0.8691	0.9286	0.9643	0.9836	0.9930	0.9973	0.9990	0.9997	0.9999
0.18	0.7187	0.8232	0.8978	0.9456	0.9734	0.9880	0.9950	0.9981	0.9993	0.9998
0.19	0.6527	0.7700	0.8595	0.9209	0.9589	0.9803	0.9913	0.9964	0.9987	0.9995
0.20	0.5836	0.7107	0.8139	0.8894	0.9393	0.9692	0.9856	0.9937	0.9975	0.9991
0.21	0.5136	0.6467	0.7617	0.8510	0.9138	0.9538	0.9771	0.9895	0.9955	0.9982
0.22	0.4448	0.5799	0.7037	0.8058	0.8819	0.9335	0.9653	0.9832	0.9925	0.9969
0.23	0.3790	0.5122	0.6415	0.7544	0.8435	0.9074	0.9492	0.9741	0.9878	0.9946
0.24	0.3178	0.4456	0.5767	0.6977	0.7987	0.8753	0.9282	0.9616	0.9809	0.9912
0.25	0.2622	0.3816	0.5110	0.6370	0.7481	0.8369	0.9017	0.9449	0.9713	0.9861
0.26	0.2129	0.3218	0.4461	0.5739	0.6925	0.7925	0.8694	0.9234	0.9582	0.9788
0.27	0.1701	0.2671	0.3837	0.5099	0.6331	0.7425	0.8311	0.8966	0.9410	0.9686
0.28	0.1337	0.2183	0.3251	0.4466	0.5714	0.6879	0.7870	0.8641	0.9191	0.9551
0.29	0.1035	0.1756	0.2713	0.3855	0.5088	0.6297	0.7377	0.8259	0.8920	0.9374
0.30	0.0789	0.1390	0.2229	0.3279	0.4468	0.5692	0.6839	0.7822	0.8594	0.9152
0.31	0.0591	0.1084	0.1803	0.2747	0.3869	0.5078	0.6266	0.7334	0.8214	0.8879
0.32	0.0437	0.0832	0.1436	0.2268	0.3302	0.4470	0.5672	0.6803	0.7780	0.8553
0.33	0.0317	0.0629	0.1127	0.1843	0.2777	0.3880	0.5069	0.6240	0.7297	0.8174
0.34	0.0227	0.0467	0.0870	0.1476	0.2301	0.3321	0.4470	0.5654	0.6773	0.7743
0.35	0.0160	0.0342	0.0661	0.1163	0.1878	0.2801	0.3889	0.5060	0.6216	0.7264
0.36	0.0111	0.0247	0.0495	0.0903	0.1509	0.2328	0.3336	0.4469	0.5638	0.6745
0.37	0.0076	0.0175	0.0365	0.0690	0.1195	0.1906	0.2821	0.3895	0.5051	0.6195
0.38	0.0051	0.0122	0.0264	0.0519	0.0931	0.1538	0.2351	0.3347	0.4467	0.5624
0.39	0.0034	0.0084	0.0189	0.0384	0.0714	0.1221	0.1930	0.2836	0.3899	0.5043
0.40	0.0022	0.0057	0.0133	0.0280	0.0540	0.0955	0.1561	0.2369	0.3356	0.4465
0.41	0.0014	0.0038	0.0092	0.0201	0.0401	0.0735	0.1243	0.1949	0.2848	0.3901
0.42	0.0009	0.0025	0.0062	0.0142	0.0293	0.0557	0.0975	0.1579	0.2383	0.3362
0.43	0.0006	0.0016	0.0042	0.0098	0.0211	0.0415	0.0752	0.1260	0.1963	0.2857
0.44	0.0003	0.0010	0.0027	0.0067	0.0149	0.0304	0.0571	0.0990	0.1594	0.2392
0.45	0.0002	0.0006	0.0018	0.0045	0.0104	0.0220	0.0427	0.0765	0.1273	0.1974
0.46	0.0001	0.0004	0.0011	0.0030	0.0071	0.0156	0.0313	0.0582	0.1002	0.1604
0.47	0.0001	0.0002	0.0007	0.0019	0.0048	0.0108	0.0226	0.0435	0.0775	0.1282
0.48	0.0000	0.0001	0.0004	0.0012	0.0032	0.0074	0.0161	0.0320	0.0590	0.1009
0.49	0.0000	0.0001	0.0003	0.0008	0.0020	0.0050	0.0112	0.0231	0.0441	0.0781
0.50	0.0000	0.0000	0.0002	0.0005	0.0013	0.0033	0.0077	0.0164	0.0325	0.0595

n = 50										
π	20	21	22	23	24	25	26	27	28	29
0.01										
0.02										
0.03										
0.04										
0.05										
0.06										
0.07										
0.08										
0.09										
0.10										
0.11										
0.12										
0.13										
0.14										
0.15										
0.16										
0.17										
0.18	0.9999									
0.19	0.9998									
0.20	0.9997	0.9999								
0.21	0.9994	0.9998	0.9999							
0.22	0.9988	0.9996	0.9999							
0.23	0.9978	0.9992	0.9997	0.9999						
0.24	0.9962	0.9985	0.9994	0.9998	0.9999					
0.25	0.9937	0.9974	0.9990	0.9996	0.9999					
0.26	0.9900	0.9956	0.9982	0.9993	0.9998	0.9999				
0.27	0.9845	0.9929	0.9969	0.9988	0.9996	0.9998				
0.28	0.9768	0.9888	0.9950	0.9979	0.9992	0.9997	0.9999			
0.29	0.9662	0.9830	0.9920	0.9965	0.9986	0.9995	0.9998	0.9999		
0.30	0.9522	0.9749	0.9877	0.9944	0.9976	0.9991	0.9997	0.9999		
0.31	0.9343	0.9640	0.9816	0.9913	0.9961	0.9984	0.9994	0.9998	0.9999	
0.32	0.9118	0.9497	0.9733	0.9867	0.9939	0.9974	0.9989	0.9996	0.9999	
0.33	0.8844	0.9315	0.9621	0.9804	0.9906	0.9958	0.9982	0.9993	0.9998	0.9999
0.34	0.8518	0.9088	0.9475	0.9718	0.9859	0.9934	0.9971	0.9988	0.9996	0.9998
0.35	0.8139	0.8813	0.9290	0.9604	0.9793	0.9900	0.9955	0.9981	0.9993	0.9997
0.36	0.7711	0.8487	0.9062	0.9456	0.9705	0.9851	0.9930	0.9969	0.9988	0.9995
0.37	0.7236	0.8110	0.8786	0.9270	0.9589	0.9784	0.9894	0.9952	0.9980	0.9992
0.38	0.6722	0.7683	0.8460	0.9040	0.9440	0.9695	0.9845	0.9926	0.9968	0.9987
0.39	0.6176	0.7212	0.8084	0.8764	0.9252	0.9577	0.9777	0.9890	0.9950	0.9979
0.40	0.5610	0.6701	0.7660	0.8438	0.9022	0.9427	0.9686	0.9840	0.9924	0.9966
0.41	0.5035	0.6160	0.7191	0.8064	0.8745	0.9238	0.9568	0.9771	0.9887	0.9948
0.42	0.4461	0.5598	0.6684	0.7641	0.8420	0.9008	0.9416	0.9680	0.9836	0.9922
0.43	0.3901	0.5027	0.6146	0.7174	0.8047	0.8731	0.9228	0.9561	0.9767	0.9885
0.44	0.3365	0.4457	0.5588	0.6669	0.7625	0.8407	0.8997	0.9409	0.9675	0.9834
0.45	0.2862	0.3900	0.5019	0.6134	0.7160	0.8034	0.8721	0.9220	0.9556	0.9765
0.46	0.2398	0.3366	0.4452	0.5578	0.6657	0.7614	0.8397	0.8990	0.9405	0.9673
0.47	0.1980	0.2863	0.3896	0.5011	0.6124	0.7150	0.8025	0.8714	0.9216	0.9554
0.48	0.1609	0.2401	0.3364	0.4446	0.5569	0.6648	0.7605	0.8391	0.8987	0.9404
0.49	0.1287	0.1982	0.2862	0.3891	0.5004	0.6115	0.7142	0.8019	0.8711	0.9216
0.50	0.1013	0.1611	0.2399	0.3359	0.4439	0.5561	0.6641	0.7601	0.8389	0.8987

n = 50									
π		30	31	32	33	34	35	36	37
0.01									
0.02									
0.03									
0.04									
0.05									
0.06									
0.07									
0.08									
0.09									
0.10									
0.11									
0.12									
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0.15									
0.16									
0.17									
0.18									
0.19									
0.20									
0.21									
0.22									
0.23									
0.24									
0.25									
0.26									
0.27									
0.28									
0.29									
0.30									
0.31									
0.32									
0.33									
0.34									
0.35	0.9999								
0.36	0.9998	0.9999							
0.37	0.9997	0.9999							
0.38	0.9995	0.9998	0.9999						
0.39	0.9992	0.9997	0.9999						
0.40	0.9986	0.9995	0.9998	0.9999					
0.41	0.9978	0.9991	0.9997	0.9999					
0.42	0.9966	0.9986	0.9995	0.9998	0.9999				
0.43	0.9947	0.9978	0.9991	0.9997	0.9999				
0.44	0.9921	0.9965	0.9986	0.9995	0.9998	0.9999			
0.45	0.9884	0.9947	0.9978	0.9991	0.9997	0.9999			
0.46	0.9833	0.9921	0.9965	0.9986	0.9995	0.9998	0.9999		
0.47	0.9764	0.9884	0.9947	0.9978	0.9992	0.9997	0.9999		
0.48	0.9673	0.9834	0.9922	0.9966	0.9986	0.9995	0.9998	0.9999	
0.49	0.9555	0.9766	0.9886	0.9948	0.9979	0.9992	0.9997	0.9999	
0.50	0.9405	0.9675	0.9836	0.9923	0.9967	0.9987	0.9995	0.9998	

2.2 Poisson Distribution

Tabulated values of $P(X \leq r)$ where $X \sim \text{Poisson}(\mu)$

μ	$r =$							μ	$r =$		
	0	1	2	3	4	5	6		0	1	2
0.00	1.0000							1.00	0.3679	0.7358	0.9197
0.02	0.9802	0.9998						1.05	0.3499	0.7174	0.9103
0.04	0.9608	0.9992						1.10	0.3329	0.6990	0.9004
0.06	0.9418	0.9983						1.15	0.3166	0.6808	0.8901
0.08	0.9231	0.9970	0.9999					1.20	0.3012	0.6626	0.8795
0.10	0.9048	0.9953	0.9998					1.25	0.2865	0.6446	0.8685
0.12	0.8869	0.9934	0.9997					1.30	0.2725	0.6268	0.8571
0.14	0.8694	0.9911	0.9996					1.35	0.2592	0.6092	0.8454
0.16	0.8521	0.9885	0.9994					1.40	0.2466	0.5918	0.8335
0.18	0.8353	0.9856	0.9992					1.45	0.2346	0.5747	0.8213
0.20	0.8187	0.9825	0.9989	0.9999				1.50	0.2231	0.5578	0.8088
0.22	0.8025	0.9791	0.9985	0.9999				1.55	0.2122	0.5412	0.7962
0.24	0.7866	0.9754	0.9981	0.9999				1.60	0.2019	0.5249	0.7834
0.26	0.7711	0.9715	0.9976	0.9998				1.65	0.1920	0.5089	0.7704
0.28	0.7558	0.9674	0.9970	0.9998				1.70	0.1827	0.4932	0.7572
0.30	0.7408	0.9631	0.9964	0.9997				1.75	0.1738	0.4779	0.7440
0.32	0.7261	0.9585	0.9957	0.9997				1.80	0.1653	0.4628	0.7306
0.34	0.7118	0.9538	0.9949	0.9996				1.85	0.1572	0.4481	0.7172
0.36	0.6977	0.9488	0.9940	0.9995				1.90	0.1496	0.4337	0.7037
0.38	0.6839	0.9437	0.9931	0.9994				1.95	0.1423	0.4197	0.6902
0.40	0.6703	0.9384	0.9921	0.9992	0.9999			2.00	0.1353	0.4060	0.6767
0.42	0.6570	0.9330	0.9910	0.9991	0.9999			2.05	0.1287	0.3926	0.6631
0.44	0.6440	0.9274	0.9898	0.9989	0.9999			2.10	0.1225	0.3796	0.6496
0.46	0.6313	0.9217	0.9885	0.9987	0.9999			2.15	0.1165	0.3669	0.6361
0.48	0.6188	0.9158	0.9871	0.9985	0.9999			2.20	0.1108	0.3546	0.6227
0.50	0.6065	0.9098	0.9856	0.9982	0.9998			2.25	0.1054	0.3425	0.6093
0.52	0.5945	0.9037	0.9841	0.9980	0.9998			2.30	0.1003	0.3309	0.5960
0.54	0.5827	0.8974	0.9824	0.9977	0.9998			2.35	0.0954	0.3195	0.5828
0.56	0.5712	0.8911	0.9807	0.9974	0.9997			2.40	0.0907	0.3084	0.5697
0.58	0.5599	0.8846	0.9788	0.9970	0.9997			2.45	0.0863	0.2977	0.5567
0.60	0.5488	0.8781	0.9769	0.9966	0.9996			2.50	0.0821	0.2873	0.5438
0.62	0.5379	0.8715	0.9749	0.9962	0.9995			2.55	0.0781	0.2772	0.5311
0.64	0.5273	0.8648	0.9727	0.9958	0.9995	0.9999		2.60	0.0743	0.2674	0.5184
0.66	0.5169	0.8580	0.9705	0.9953	0.9994	0.9999		2.65	0.0707	0.2579	0.5060
0.68	0.5066	0.8511	0.9682	0.9948	0.9993	0.9999		2.70	0.0672	0.2487	0.4936
0.70	0.4966	0.8442	0.9659	0.9942	0.9992	0.9999		2.75	0.0639	0.2397	0.4815
0.72	0.4868	0.8372	0.9634	0.9937	0.9991	0.9999		2.80	0.0608	0.2311	0.4695
0.74	0.4771	0.8302	0.9608	0.9930	0.9990	0.9999		2.85	0.0578	0.2227	0.4576
0.76	0.4677	0.8231	0.9582	0.9924	0.9989	0.9999		2.90	0.0550	0.2146	0.4460
0.78	0.4584	0.8160	0.9554	0.9917	0.9987	0.9998		2.95	0.0523	0.2067	0.4345
0.80	0.4493	0.8088	0.9526	0.9909	0.9986	0.9998		3.00	0.0498	0.1991	0.4232
0.82	0.4404	0.8016	0.9497	0.9901	0.9984	0.9998		3.05	0.0474	0.1918	0.4121
0.84	0.4317	0.7943	0.9467	0.9893	0.9983	0.9998		3.10	0.0450	0.1847	0.4012
0.86	0.4232	0.7871	0.9436	0.9884	0.9981	0.9997		3.15	0.0429	0.1778	0.3904
0.88	0.4148	0.7798	0.9404	0.9875	0.9979	0.9997		3.20	0.0408	0.1712	0.3799
0.90	0.4066	0.7725	0.9371	0.9865	0.9977	0.9997		3.25	0.0388	0.1648	0.3696
0.92	0.3985	0.7652	0.9338	0.9855	0.9974	0.9996		3.30	0.0369	0.1586	0.3594
0.94	0.3906	0.7578	0.9304	0.9845	0.9972	0.9996	0.9999	3.35	0.0351	0.1526	0.3495
0.96	0.3829	0.7505	0.9269	0.9834	0.9969	0.9995	0.9999	3.40	0.0334	0.1468	0.3397
0.98	0.3753	0.7431	0.9233	0.9822	0.9966	0.9995	0.9999	3.45	0.0317	0.1413	0.3302
1.00	0.3679	0.7358	0.9197	0.9810	0.9963	0.9994	0.9999	3.50	0.0302	0.1359	0.3208

μ	$r =$										
	3	4	5	6	7	8	9	10	11	12	
1.00	0.9810	0.9963	0.9994	0.9999							
1.05	0.9778	0.9955	0.9992	0.9999							
1.10	0.9743	0.9946	0.9990	0.9999							
1.15	0.9704	0.9935	0.9988	0.9998							
1.20	0.9662	0.9923	0.9985	0.9997							
1.25	0.9617	0.9909	0.9982	0.9997							
1.30	0.9569	0.9893	0.9978	0.9996	0.9999						
1.35	0.9518	0.9876	0.9973	0.9995	0.9999						
1.40	0.9463	0.9857	0.9968	0.9994	0.9999						
1.45	0.9405	0.9837	0.9962	0.9992	0.9999						
1.50	0.9344	0.9814	0.9955	0.9991	0.9998						
1.55	0.9279	0.9790	0.9948	0.9989	0.9998						
1.60	0.9212	0.9763	0.9940	0.9987	0.9997						
1.65	0.9141	0.9735	0.9930	0.9984	0.9997	0.9999					
1.70	0.9068	0.9704	0.9920	0.9981	0.9996	0.9999					
1.75	0.8992	0.9671	0.9909	0.9978	0.9995	0.9999					
1.80	0.8913	0.9636	0.9896	0.9974	0.9994	0.9999					
1.85	0.8831	0.9599	0.9883	0.9970	0.9993	0.9999					
1.90	0.8747	0.9559	0.9868	0.9966	0.9992	0.9998					
1.95	0.8660	0.9517	0.9852	0.9960	0.9991	0.9998					
2.00	0.8571	0.9473	0.9834	0.9955	0.9989	0.9998					
2.05	0.8480	0.9427	0.9816	0.9948	0.9987	0.9997	0.9999				
2.10	0.8386	0.9379	0.9796	0.9941	0.9985	0.9997	0.9999				
2.15	0.8291	0.9328	0.9774	0.9934	0.9983	0.9996	0.9999				
2.20	0.8194	0.9275	0.9751	0.9925	0.9980	0.9995	0.9999				
2.25	0.8094	0.9220	0.9726	0.9916	0.9977	0.9994	0.9999				
2.30	0.7993	0.9162	0.9700	0.9906	0.9974	0.9994	0.9999				
2.35	0.7891	0.9103	0.9673	0.9896	0.9971	0.9993	0.9998				
2.40	0.7787	0.9041	0.9643	0.9884	0.9967	0.9991	0.9998				
2.45	0.7682	0.8978	0.9612	0.9872	0.9962	0.9990	0.9998	0.9999			
2.50	0.7576	0.8912	0.9580	0.9858	0.9958	0.9989	0.9997	0.9999			
2.55	0.7468	0.8844	0.9546	0.9844	0.9952	0.9987	0.9997	0.9999			
2.60	0.7360	0.8774	0.9510	0.9828	0.9947	0.9985	0.9996	0.9999			
2.65	0.7251	0.8703	0.9472	0.9812	0.9940	0.9983	0.9996	0.9999			
2.70	0.7141	0.8629	0.9433	0.9794	0.9934	0.9981	0.9995	0.9999			
2.75	0.7030	0.8554	0.9392	0.9776	0.9927	0.9978	0.9994	0.9999			
2.80	0.6919	0.8477	0.9349	0.9756	0.9919	0.9976	0.9993	0.9998			
2.85	0.6808	0.8398	0.9304	0.9735	0.9910	0.9973	0.9992	0.9998			
2.90	0.6696	0.8318	0.9258	0.9713	0.9901	0.9969	0.9991	0.9998	0.9999		
2.95	0.6584	0.8236	0.9210	0.9689	0.9891	0.9966	0.9990	0.9997	0.9999		
3.00	0.6472	0.8153	0.9161	0.9665	0.9881	0.9962	0.9989	0.9997	0.9999		
3.05	0.6360	0.8068	0.9110	0.9639	0.9870	0.9958	0.9988	0.9997	0.9999		
3.10	0.6248	0.7982	0.9057	0.9612	0.9858	0.9953	0.9986	0.9996	0.9999		
3.15	0.6137	0.7895	0.9002	0.9584	0.9845	0.9948	0.9984	0.9996	0.9999		
3.20	0.6025	0.7806	0.8946	0.9554	0.9832	0.9943	0.9982	0.9995	0.9999		
3.25	0.5914	0.7717	0.8888	0.9523	0.9817	0.9937	0.9980	0.9994	0.9999		
3.30	0.5803	0.7626	0.8829	0.9490	0.9802	0.9931	0.9978	0.9994	0.9998		
3.35	0.5693	0.7534	0.8768	0.9457	0.9786	0.9924	0.9976	0.9993	0.9998		
3.40	0.5584	0.7442	0.8705	0.9421	0.9769	0.9917	0.9973	0.9992	0.9998	0.9999	
3.45	0.5475	0.7349	0.8642	0.9385	0.9751	0.9909	0.9970	0.9991	0.9997	0.9999	
3.50	0.5366	0.7254	0.8576	0.9347	0.9733	0.9901	0.9967	0.9990	0.9997	0.9999	

μ	$r =$										
	0	1	2	3	4	5	6	7	8	9	10
3.50	0.0302	0.1359	0.3208	0.5366	0.7254	0.8576	0.9347	0.9733	0.9901	0.9967	0.9990
3.55	0.0287	0.1307	0.3117	0.5259	0.7160	0.8509	0.9308	0.9713	0.9893	0.9963	0.9989
3.60	0.0273	0.1257	0.3027	0.5152	0.7064	0.8441	0.9267	0.9692	0.9883	0.9960	0.9987
3.65	0.0260	0.1209	0.2940	0.5046	0.6969	0.8372	0.9225	0.9670	0.9873	0.9956	0.9986
3.70	0.0247	0.1162	0.2854	0.4942	0.6872	0.8301	0.9182	0.9648	0.9863	0.9952	0.9984
3.75	0.0235	0.1117	0.2771	0.4838	0.6775	0.8229	0.9137	0.9624	0.9852	0.9947	0.9983
3.80	0.0224	0.1074	0.2689	0.4735	0.6678	0.8156	0.9091	0.9599	0.9840	0.9942	0.9981
3.85	0.0213	0.1032	0.2609	0.4633	0.6581	0.8081	0.9044	0.9573	0.9828	0.9937	0.9979
3.90	0.0202	0.0992	0.2531	0.4532	0.6484	0.8006	0.8995	0.9546	0.9815	0.9931	0.9977
3.95	0.0193	0.0953	0.2455	0.4433	0.6386	0.7929	0.8945	0.9518	0.9801	0.9925	0.9974
4.00	0.0183	0.0916	0.2381	0.4335	0.6288	0.7851	0.8893	0.9489	0.9786	0.9919	0.9972
4.05	0.0174	0.0880	0.2309	0.4238	0.6191	0.7773	0.8841	0.9458	0.9771	0.9912	0.9969
4.10	0.0166	0.0845	0.2238	0.4142	0.6093	0.7693	0.8786	0.9427	0.9755	0.9905	0.9966
4.15	0.0158	0.0812	0.2169	0.4047	0.5996	0.7613	0.8731	0.9394	0.9738	0.9897	0.9963
4.20	0.0150	0.0780	0.2102	0.3954	0.5898	0.7531	0.8675	0.9361	0.9721	0.9889	0.9959
4.25	0.0143	0.0749	0.2037	0.3862	0.5801	0.7449	0.8617	0.9326	0.9702	0.9880	0.9956
4.30	0.0136	0.0719	0.1974	0.3772	0.5704	0.7367	0.8558	0.9290	0.9683	0.9871	0.9952
4.35	0.0129	0.0691	0.1912	0.3682	0.5608	0.7283	0.8498	0.9253	0.9663	0.9861	0.9948
4.40	0.0123	0.0663	0.1851	0.3594	0.5512	0.7199	0.8436	0.9214	0.9642	0.9851	0.9943
4.45	0.0117	0.0636	0.1793	0.3508	0.5416	0.7114	0.8374	0.9175	0.9620	0.9840	0.9938
4.50	0.0111	0.0611	0.1736	0.3423	0.5321	0.7029	0.8311	0.9134	0.9597	0.9829	0.9933
4.55	0.0106	0.0586	0.1680	0.3339	0.5226	0.6944	0.8246	0.9092	0.9574	0.9817	0.9928
4.60	0.0101	0.0563	0.1626	0.3257	0.5132	0.6858	0.8180	0.9049	0.9549	0.9805	0.9922
4.65	0.0096	0.0540	0.1574	0.3176	0.5039	0.6771	0.8114	0.9005	0.9524	0.9792	0.9916
4.70	0.0091	0.0518	0.1523	0.3097	0.4946	0.6684	0.8046	0.8960	0.9497	0.9778	0.9910
4.75	0.0087	0.0497	0.1473	0.3019	0.4854	0.6597	0.7978	0.8914	0.9470	0.9764	0.9903
4.80	0.0082	0.0477	0.1425	0.2942	0.4763	0.6510	0.7908	0.8867	0.9442	0.9749	0.9896
4.85	0.0078	0.0458	0.1379	0.2867	0.4672	0.6423	0.7838	0.8818	0.9413	0.9733	0.9888
4.90	0.0074	0.0439	0.1333	0.2793	0.4582	0.6335	0.7767	0.8769	0.9382	0.9717	0.9880
4.95	0.0071	0.0421	0.1289	0.2721	0.4493	0.6247	0.7695	0.8718	0.9351	0.9699	0.9872
5.00	0.0067	0.0404	0.1247	0.2650	0.4405	0.6160	0.7622	0.8666	0.9319	0.9682	0.9863
5.05	0.0064	0.0388	0.1205	0.2581	0.4318	0.6072	0.7548	0.8614	0.9286	0.9663	0.9854
5.10	0.0061	0.0372	0.1165	0.2513	0.4231	0.5984	0.7474	0.8560	0.9252	0.9644	0.9844
5.15	0.0058	0.0357	0.1126	0.2446	0.4146	0.5897	0.7399	0.8505	0.9217	0.9624	0.9834
5.20	0.0055	0.0342	0.1088	0.2381	0.4061	0.5809	0.7324	0.8449	0.9181	0.9603	0.9823
5.25	0.0052	0.0328	0.1051	0.2317	0.3978	0.5722	0.7248	0.8392	0.9144	0.9582	0.9812
5.30	0.0050	0.0314	0.1016	0.2254	0.3895	0.5635	0.7171	0.8335	0.9106	0.9559	0.9800
5.35	0.0047	0.0302	0.0981	0.2193	0.3814	0.5548	0.7094	0.8276	0.9067	0.9536	0.9788
5.40	0.0045	0.0289	0.0948	0.2133	0.3733	0.5461	0.7017	0.8217	0.9027	0.9512	0.9775
5.45	0.0043	0.0277	0.0915	0.2074	0.3654	0.5375	0.6939	0.8156	0.8986	0.9488	0.9761
5.50	0.0041	0.0266	0.0884	0.2017	0.3575	0.5289	0.6860	0.8095	0.8944	0.9462	0.9747
5.55	0.0039	0.0255	0.0853	0.1961	0.3498	0.5204	0.6782	0.8033	0.8901	0.9436	0.9733
5.60	0.0037	0.0244	0.0824	0.1906	0.3422	0.5119	0.6703	0.7970	0.8857	0.9409	0.9718
5.65	0.0035	0.0234	0.0795	0.1853	0.3346	0.5034	0.6623	0.7906	0.8812	0.9381	0.9702
5.70	0.0033	0.0224	0.0768	0.1800	0.3272	0.4950	0.6544	0.7841	0.8766	0.9352	0.9686
5.75	0.0032	0.0215	0.0741	0.1749	0.3199	0.4866	0.6464	0.7776	0.8719	0.9322	0.9669
5.80	0.0030	0.0206	0.0715	0.1700	0.3127	0.4783	0.6384	0.7710	0.8672	0.9292	0.9651
5.85	0.0029	0.0197	0.0690	0.1651	0.3056	0.4701	0.6304	0.7644	0.8623	0.9260	0.9633
5.90	0.0027	0.0189	0.0666	0.1604	0.2987	0.4619	0.6224	0.7576	0.8574	0.9228	0.9614
5.95	0.0026	0.0181	0.0642	0.1557	0.2918	0.4537	0.6143	0.7508	0.8524	0.9195	0.9594
6.00	0.0025	0.0174	0.0620	0.1512	0.2851	0.4457	0.6063	0.7440	0.8472	0.9161	0.9574

μ	$r =$							μ	$r =$		
	11	12	13	14	15	16	17		0	1	2
3.50	0.9997	0.9999						6.00	0.0025	0.0174	0.0620
3.55	0.9997	0.9999						6.10	0.0022	0.0159	0.0577
3.60	0.9996	0.9999						6.20	0.0020	0.0146	0.0536
3.65	0.9996	0.9999						6.30	0.0018	0.0134	0.0498
3.70	0.9995	0.9999						6.40	0.0017	0.0123	0.0463
3.75	0.9995	0.9999						6.50	0.0015	0.0113	0.0430
3.80	0.9994	0.9998						6.60	0.0014	0.0103	0.0400
3.85	0.9993	0.9998	0.9999					6.70	0.0012	0.0095	0.0371
3.90	0.9993	0.9998	0.9999					6.80	0.0011	0.0087	0.0344
3.95	0.9992	0.9998	0.9999					6.90	0.0010	0.0080	0.0320
4.00	0.9991	0.9997	0.9999					7.00	0.0009	0.0073	0.0296
4.05	0.9990	0.9997	0.9999					7.10	0.0008	0.0067	0.0275
4.10	0.9989	0.9997	0.9999					7.20	0.0007	0.0061	0.0255
4.15	0.9988	0.9996	0.9999					7.30	0.0007	0.0056	0.0236
4.20	0.9986	0.9996	0.9999					7.40	0.0006	0.0051	0.0219
4.25	0.9985	0.9995	0.9999					7.50	0.0006	0.0047	0.0203
4.30	0.9983	0.9995	0.9998					7.60	0.0005	0.0043	0.0188
4.35	0.9982	0.9994	0.9998	0.9999				7.70	0.0005	0.0039	0.0174
4.40	0.9980	0.9993	0.9998	0.9999				7.80	0.0004	0.0036	0.0161
4.45	0.9978	0.9993	0.9998	0.9999				7.90	0.0004	0.0033	0.0149
4.50	0.9976	0.9992	0.9997	0.9999				8.00	0.0003	0.0030	0.0138
4.55	0.9974	0.9991	0.9997	0.9999				8.10	0.0003	0.0028	0.0127
4.60	0.9971	0.9990	0.9997	0.9999				8.20	0.0003	0.0025	0.0118
4.65	0.9969	0.9989	0.9997	0.9999				8.30	0.0002	0.0023	0.0109
4.70	0.9966	0.9988	0.9996	0.9999				8.40	0.0002	0.0021	0.0100
4.75	0.9963	0.9987	0.9996	0.9999				8.50	0.0002	0.0019	0.0093
4.80	0.9960	0.9986	0.9995	0.9999				8.60	0.0002	0.0018	0.0086
4.85	0.9957	0.9984	0.9995	0.9998				8.70	0.0002	0.0016	0.0079
4.90	0.9953	0.9983	0.9994	0.9998	0.9999			8.80	0.0002	0.0015	0.0073
4.95	0.9949	0.9981	0.9994	0.9998	0.9999			8.90	0.0001	0.0014	0.0068
5.00	0.9945	0.9980	0.9993	0.9998	0.9999			9.00	0.0001	0.0012	0.0062
5.05	0.9941	0.9978	0.9992	0.9997	0.9999			9.10	0.0001	0.0011	0.0058
5.10	0.9937	0.9976	0.9992	0.9997	0.9999			9.20	0.0001	0.0010	0.0053
5.15	0.9932	0.9974	0.9991	0.9997	0.9999			9.30	0.0001	0.0009	0.0049
5.20	0.9927	0.9972	0.9990	0.9997	0.9999			9.40	0.0001	0.0009	0.0045
5.25	0.9922	0.9970	0.9989	0.9996	0.9999			9.50	0.0001	0.0008	0.0042
5.30	0.9916	0.9967	0.9988	0.9996	0.9999			9.60	0.0001	0.0007	0.0038
5.35	0.9910	0.9964	0.9987	0.9995	0.9999			9.70	0.0001	0.0007	0.0035
5.40	0.9904	0.9962	0.9986	0.9995	0.9998	0.9999		9.80	0.0001	0.0006	0.0033
5.45	0.9897	0.9959	0.9984	0.9995	0.9998	0.9999		9.90	0.0001	0.0005	0.0030
5.50	0.9890	0.9955	0.9983	0.9994	0.9998	0.9999		10.00	0.0000	0.0005	0.0028
5.55	0.9883	0.9952	0.9982	0.9993	0.9998	0.9999		10.10	0.0000	0.0005	0.0026
5.60	0.9875	0.9949	0.9980	0.9993	0.9998	0.9999		10.20	0.0000	0.0004	0.0023
5.65	0.9867	0.9945	0.9979	0.9992	0.9997	0.9999		10.30	0.0000	0.0004	0.0022
5.70	0.9859	0.9941	0.9977	0.9991	0.9997	0.9999		10.40	0.0000	0.0003	0.0020
5.75	0.9850	0.9937	0.9975	0.9991	0.9997	0.9999		10.50	0.0000	0.0003	0.0018
5.80	0.9841	0.9932	0.9973	0.9990	0.9996	0.9999		10.60	0.0000	0.0003	0.0017
5.85	0.9831	0.9927	0.9971	0.9989	0.9996	0.9999		10.70	0.0000	0.0003	0.0016
5.90	0.9821	0.9922	0.9969	0.9988	0.9996	0.9999		10.80	0.0000	0.0002	0.0014
5.95	0.9810	0.9917	0.9966	0.9987	0.9995	0.9998	0.9999	10.90	0.0000	0.0002	0.0013
6.00	0.9799	0.9912	0.9964	0.9986	0.9995	0.9998	0.9999	11.00	0.0000	0.0002	0.0012

μ	$r =$										
	3	4	5	6	7	8	9	10	11	12	13
6.00	0.1512	0.2851	0.4457	0.6063	0.7440	0.8472	0.9161	0.9574	0.9799	0.9912	0.9964
6.10	0.1425	0.2719	0.4298	0.5902	0.7301	0.8367	0.9090	0.9531	0.9776	0.9900	0.9958
6.20	0.1342	0.2592	0.4141	0.5742	0.7160	0.8259	0.9016	0.9486	0.9750	0.9887	0.9952
6.30	0.1264	0.2469	0.3988	0.5582	0.7017	0.8148	0.8939	0.9437	0.9723	0.9873	0.9945
6.40	0.1189	0.2351	0.3837	0.5423	0.6873	0.8033	0.8858	0.9386	0.9693	0.9857	0.9937
6.50	0.1118	0.2237	0.3690	0.5265	0.6728	0.7916	0.8774	0.9332	0.9661	0.9840	0.9929
6.60	0.1052	0.2127	0.3547	0.5108	0.6581	0.7796	0.8686	0.9274	0.9627	0.9821	0.9920
6.70	0.0988	0.2022	0.3406	0.4953	0.6433	0.7673	0.8596	0.9214	0.9591	0.9801	0.9909
6.80	0.0928	0.1920	0.3270	0.4799	0.6285	0.7548	0.8502	0.9151	0.9552	0.9779	0.9898
6.90	0.0871	0.1823	0.3137	0.4647	0.6136	0.7420	0.8405	0.9084	0.9510	0.9755	0.9885
7.00	0.0818	0.1730	0.3007	0.4497	0.5987	0.7291	0.8305	0.9015	0.9467	0.9730	0.9872
7.10	0.0767	0.1641	0.2881	0.4349	0.5838	0.7160	0.8202	0.8942	0.9420	0.9703	0.9857
7.20	0.0719	0.1555	0.2759	0.4204	0.5689	0.7027	0.8096	0.8867	0.9371	0.9673	0.9841
7.30	0.0674	0.1473	0.2640	0.4060	0.5541	0.6892	0.7988	0.8788	0.9319	0.9642	0.9824
7.40	0.0632	0.1395	0.2526	0.3920	0.5393	0.6757	0.7877	0.8707	0.9265	0.9609	0.9805
7.50	0.0591	0.1321	0.2414	0.3782	0.5246	0.6620	0.7764	0.8622	0.9208	0.9573	0.9784
7.60	0.0554	0.1249	0.2307	0.3646	0.5100	0.6482	0.7649	0.8535	0.9148	0.9536	0.9762
7.70	0.0518	0.1181	0.2203	0.3514	0.4956	0.6343	0.7531	0.8445	0.9085	0.9496	0.9739
7.80	0.0485	0.1117	0.2103	0.3384	0.4812	0.6204	0.7411	0.8352	0.9020	0.9454	0.9714
7.90	0.0453	0.1055	0.2006	0.3257	0.4670	0.6065	0.7290	0.8257	0.8952	0.9409	0.9687
8.00	0.0424	0.0996	0.1912	0.3134	0.4530	0.5925	0.7166	0.8159	0.8881	0.9362	0.9658
8.10	0.0396	0.0940	0.1822	0.3013	0.4391	0.5786	0.7041	0.8058	0.8807	0.9313	0.9628
8.20	0.0370	0.0887	0.1736	0.2896	0.4254	0.5647	0.6915	0.7955	0.8731	0.9261	0.9595
8.30	0.0346	0.0837	0.1653	0.2781	0.4119	0.5507	0.6788	0.7850	0.8652	0.9207	0.9561
8.40	0.0323	0.0789	0.1573	0.2670	0.3987	0.5369	0.6659	0.7743	0.8571	0.9150	0.9524
8.50	0.0301	0.0744	0.1496	0.2562	0.3856	0.5231	0.6530	0.7634	0.8487	0.9091	0.9486
8.60	0.0281	0.0701	0.1422	0.2457	0.3728	0.5094	0.6400	0.7522	0.8400	0.9029	0.9445
8.70	0.0262	0.0660	0.1352	0.2355	0.3602	0.4958	0.6269	0.7409	0.8311	0.8965	0.9403
8.80	0.0244	0.0621	0.1284	0.2256	0.3478	0.4823	0.6137	0.7294	0.8220	0.8898	0.9358
8.90	0.0228	0.0584	0.1219	0.2160	0.3357	0.4689	0.6006	0.7178	0.8126	0.8829	0.9311
9.00	0.0212	0.0550	0.1157	0.2068	0.3239	0.4557	0.5874	0.7060	0.8030	0.8758	0.9261
9.10	0.0198	0.0517	0.1098	0.1978	0.3123	0.4426	0.5742	0.6941	0.7932	0.8684	0.9210
9.20	0.0184	0.0486	0.1041	0.1892	0.3010	0.4296	0.5611	0.6820	0.7832	0.8607	0.9156
9.30	0.0172	0.0456	0.0986	0.1808	0.2900	0.4168	0.5479	0.6699	0.7730	0.8529	0.9100
9.40	0.0160	0.0429	0.0935	0.1727	0.2792	0.4042	0.5349	0.6576	0.7626	0.8448	0.9042
9.50	0.0149	0.0403	0.0885	0.1649	0.2687	0.3918	0.5218	0.6453	0.7520	0.8364	0.8981
9.60	0.0138	0.0378	0.0838	0.1574	0.2584	0.3796	0.5089	0.6329	0.7412	0.8279	0.8919
9.70	0.0129	0.0355	0.0793	0.1502	0.2485	0.3676	0.4960	0.6205	0.7303	0.8191	0.8853
9.80	0.0120	0.0333	0.0750	0.1433	0.2388	0.3558	0.4832	0.6080	0.7193	0.8101	0.8786
9.90	0.0111	0.0312	0.0710	0.1366	0.2294	0.3442	0.4705	0.5955	0.7081	0.8009	0.8716
10.00	0.0103	0.0293	0.0671	0.1301	0.2202	0.3328	0.4579	0.5830	0.6968	0.7916	0.8645
10.10	0.0096	0.0274	0.0634	0.1240	0.2113	0.3217	0.4455	0.5705	0.6853	0.7820	0.8571
10.20	0.0089	0.0257	0.0599	0.1180	0.2027	0.3108	0.4332	0.5580	0.6738	0.7722	0.8494
10.30	0.0083	0.0241	0.0566	0.1123	0.1944	0.3001	0.4210	0.5456	0.6622	0.7623	0.8416
10.40	0.0077	0.0225	0.0534	0.1069	0.1863	0.2896	0.4090	0.5331	0.6505	0.7522	0.8336
10.50	0.0071	0.0211	0.0504	0.1016	0.1785	0.2794	0.3971	0.5207	0.6387	0.7420	0.8253
10.60	0.0066	0.0197	0.0475	0.0966	0.1710	0.2694	0.3854	0.5084	0.6269	0.7316	0.8169
10.70	0.0062	0.0185	0.0448	0.0918	0.1636	0.2597	0.3739	0.4961	0.6150	0.7210	0.8083
10.80	0.0057	0.0173	0.0423	0.0872	0.1566	0.2502	0.3626	0.4840	0.6031	0.7104	0.7995
10.90	0.0053	0.0162	0.0398	0.0828	0.1498	0.2410	0.3515	0.4719	0.5912	0.6996	0.7905
11.00	0.0049	0.0151	0.0375	0.0786	0.1432	0.2320	0.3405	0.4599	0.5793	0.6887	0.7813

μ	$r =$										
	14	15	16	17	18	19	20	21	22	23	24
6.00	0.9986	0.9995	0.9998	0.9999							
6.10	0.9984	0.9994	0.9998	0.9999							
6.20	0.9981	0.9993	0.9997	0.9999							
6.30	0.9978	0.9992	0.9997	0.9999							
6.40	0.9974	0.9990	0.9996	0.9999							
6.50	0.9970	0.9988	0.9996	0.9998	0.9999						
6.60	0.9966	0.9986	0.9995	0.9998	0.9999						
6.70	0.9961	0.9984	0.9994	0.9998	0.9999						
6.80	0.9956	0.9982	0.9993	0.9997	0.9999						
6.90	0.9950	0.9979	0.9992	0.9997	0.9999						
7.00	0.9943	0.9976	0.9990	0.9996	0.9999						
7.10	0.9935	0.9972	0.9989	0.9996	0.9998	0.9999					
7.20	0.9927	0.9969	0.9987	0.9995	0.9998	0.9999					
7.30	0.9918	0.9964	0.9985	0.9994	0.9998	0.9999					
7.40	0.9908	0.9959	0.9983	0.9993	0.9997	0.9999					
7.50	0.9897	0.9954	0.9980	0.9992	0.9997	0.9999					
7.60	0.9886	0.9948	0.9978	0.9991	0.9996	0.9999					
7.70	0.9873	0.9941	0.9974	0.9989	0.9996	0.9998	0.9999				
7.80	0.9859	0.9934	0.9971	0.9988	0.9995	0.9998	0.9999				
7.90	0.9844	0.9926	0.9967	0.9986	0.9994	0.9998	0.9999				
8.00	0.9827	0.9918	0.9963	0.9984	0.9993	0.9997	0.9999				
8.10	0.9810	0.9908	0.9958	0.9982	0.9992	0.9997	0.9999				
8.20	0.9791	0.9898	0.9953	0.9979	0.9991	0.9997	0.9999				
8.30	0.9771	0.9887	0.9947	0.9977	0.9990	0.9996	0.9998	0.9999			
8.40	0.9749	0.9875	0.9941	0.9973	0.9989	0.9995	0.9998	0.9999			
8.50	0.9726	0.9862	0.9934	0.9970	0.9987	0.9995	0.9998	0.9999			
8.60	0.9701	0.9848	0.9926	0.9966	0.9985	0.9994	0.9998	0.9999			
8.70	0.9675	0.9832	0.9918	0.9962	0.9983	0.9993	0.9997	0.9999			
8.80	0.9647	0.9816	0.9909	0.9957	0.9981	0.9992	0.9997	0.9999			
8.90	0.9617	0.9798	0.9899	0.9952	0.9978	0.9991	0.9996	0.9998	0.9999		
9.00	0.9585	0.9780	0.9889	0.9947	0.9976	0.9989	0.9996	0.9998	0.9999		
9.10	0.9552	0.9760	0.9878	0.9941	0.9973	0.9988	0.9995	0.9998	0.9999		
9.20	0.9517	0.9738	0.9865	0.9934	0.9969	0.9986	0.9994	0.9998	0.9999		
9.30	0.9480	0.9715	0.9852	0.9927	0.9966	0.9985	0.9993	0.9997	0.9999		
9.40	0.9441	0.9691	0.9838	0.9919	0.9962	0.9983	0.9992	0.9997	0.9999		
9.50	0.9400	0.9665	0.9823	0.9911	0.9957	0.9980	0.9991	0.9996	0.9999	0.9999	
9.60	0.9357	0.9638	0.9806	0.9902	0.9952	0.9978	0.9990	0.9996	0.9998	0.9999	
9.70	0.9312	0.9609	0.9789	0.9892	0.9947	0.9975	0.9989	0.9995	0.9998	0.9999	
9.80	0.9265	0.9579	0.9770	0.9881	0.9941	0.9972	0.9987	0.9995	0.9998	0.9999	
9.90	0.9216	0.9546	0.9751	0.9870	0.9935	0.9969	0.9986	0.9994	0.9997	0.9999	
10.00	0.9165	0.9513	0.9730	0.9857	0.9928	0.9965	0.9984	0.9993	0.9997	0.9999	
10.10	0.9112	0.9477	0.9707	0.9844	0.9921	0.9962	0.9982	0.9992	0.9997	0.9999	0.9999
10.20	0.9057	0.9440	0.9684	0.9830	0.9913	0.9957	0.9980	0.9991	0.9996	0.9998	0.9999
10.30	0.9000	0.9400	0.9658	0.9815	0.9904	0.9953	0.9978	0.9990	0.9996	0.9998	0.9999
10.40	0.8940	0.9359	0.9632	0.9799	0.9895	0.9948	0.9975	0.9989	0.9995	0.9998	0.9999
10.50	0.8879	0.9317	0.9604	0.9781	0.9885	0.9942	0.9972	0.9987	0.9994	0.9998	0.9999
10.60	0.8815	0.9272	0.9574	0.9763	0.9874	0.9936	0.9969	0.9986	0.9994	0.9997	0.9999
10.70	0.8750	0.9225	0.9543	0.9744	0.9863	0.9930	0.9966	0.9984	0.9993	0.9997	0.9999
10.80	0.8682	0.9177	0.9511	0.9723	0.9850	0.9923	0.9962	0.9982	0.9992	0.9996	0.9998
10.90	0.8612	0.9126	0.9477	0.9701	0.9837	0.9915	0.9958	0.9980	0.9991	0.9996	0.9998
11.00	0.8540	0.9074	0.9441	0.9678	0.9823	0.9907	0.9953	0.9977	0.9990	0.9995	0.9998

μ	$r =$										
	1	2	3	4	5	6	7	8	9	10	11
11.00	0.0002	0.0012	0.0049	0.0151	0.0375	0.0786	0.1432	0.2320	0.3405	0.4599	0.5793
11.20	0.0002	0.0010	0.0042	0.0132	0.0333	0.0708	0.1307	0.2147	0.3192	0.4362	0.5554
11.40	0.0001	0.0009	0.0036	0.0115	0.0295	0.0636	0.1192	0.1984	0.2987	0.4131	0.5316
11.60	0.0001	0.0007	0.0031	0.0100	0.0261	0.0571	0.1085	0.1830	0.2791	0.3905	0.5080
11.80	0.0001	0.0006	0.0027	0.0087	0.0230	0.0512	0.0986	0.1686	0.2603	0.3685	0.4847
12.00	0.0001	0.0005	0.0023	0.0076	0.0203	0.0458	0.0895	0.1550	0.2424	0.3472	0.4616
12.20	0.0001	0.0004	0.0020	0.0066	0.0179	0.0410	0.0811	0.1424	0.2254	0.3266	0.4389
12.40	0.0001	0.0004	0.0017	0.0057	0.0158	0.0366	0.0734	0.1305	0.2092	0.3067	0.4167
12.60	0.0000	0.0003	0.0014	0.0050	0.0139	0.0326	0.0664	0.1195	0.1939	0.2876	0.3950
12.80	0.0000	0.0003	0.0012	0.0043	0.0122	0.0291	0.0599	0.1093	0.1794	0.2693	0.3738
13.00	0.0000	0.0002	0.0011	0.0037	0.0107	0.0259	0.0540	0.0998	0.1658	0.2517	0.3532
13.20	0.0000	0.0002	0.0009	0.0032	0.0094	0.0230	0.0487	0.0910	0.1530	0.2349	0.3332
13.40	0.0000	0.0002	0.0008	0.0028	0.0083	0.0204	0.0438	0.0828	0.1410	0.2189	0.3139
13.60	0.0000	0.0001	0.0007	0.0024	0.0072	0.0181	0.0393	0.0753	0.1297	0.2037	0.2952
13.80	0.0000	0.0001	0.0006	0.0021	0.0063	0.0161	0.0353	0.0684	0.1192	0.1893	0.2773
14.00	0.0000	0.0001	0.0005	0.0018	0.0055	0.0142	0.0316	0.0621	0.1094	0.1757	0.2600
14.20	0.0000	0.0001	0.0004	0.0016	0.0048	0.0126	0.0283	0.0562	0.1003	0.1628	0.2435
14.40	0.0000	0.0001	0.0003	0.0013	0.0042	0.0111	0.0253	0.0509	0.0918	0.1507	0.2277
14.60	0.0000	0.0001	0.0003	0.0012	0.0037	0.0098	0.0226	0.0460	0.0839	0.1392	0.2127
14.80	0.0000	0.0000	0.0002	0.0010	0.0032	0.0087	0.0202	0.0415	0.0766	0.1285	0.1984
15.00	0.0000	0.0000	0.0002	0.0009	0.0028	0.0076	0.0180	0.0374	0.0699	0.1185	0.1848
15.20	0.0000	0.0000	0.0002	0.0007	0.0024	0.0067	0.0160	0.0337	0.0636	0.1091	0.1718
15.40	0.0000	0.0000	0.0002	0.0006	0.0021	0.0059	0.0143	0.0304	0.0579	0.1003	0.1596
15.60	0.0000	0.0000	0.0001	0.0005	0.0018	0.0052	0.0127	0.0273	0.0526	0.0921	0.1481
15.80	0.0000	0.0000	0.0001	0.0005	0.0016	0.0046	0.0113	0.0245	0.0478	0.0845	0.1372
16.00	0.0000	0.0000	0.0001	0.0004	0.0014	0.0040	0.0100	0.0220	0.0433	0.0774	0.1270
16.20	0.0000	0.0000	0.0001	0.0003	0.0012	0.0035	0.0089	0.0197	0.0392	0.0708	0.1174
16.40	0.0000	0.0000	0.0001	0.0003	0.0010	0.0031	0.0079	0.0176	0.0355	0.0647	0.1084
16.60	0.0000	0.0000	0.0001	0.0003	0.0009	0.0027	0.0070	0.0158	0.0321	0.0591	0.0999
16.80	0.0000	0.0000	0.0000	0.0002	0.0008	0.0024	0.0061	0.0141	0.0290	0.0539	0.0920
17.00	0.0000	0.0000	0.0000	0.0002	0.0007	0.0021	0.0054	0.0126	0.0261	0.0491	0.0847
17.20	0.0000	0.0000	0.0000	0.0002	0.0006	0.0018	0.0048	0.0112	0.0235	0.0447	0.0778
17.40	0.0000	0.0000	0.0000	0.0001	0.0005	0.0016	0.0042	0.0100	0.0212	0.0406	0.0714
17.60	0.0000	0.0000	0.0000	0.0001	0.0004	0.0014	0.0037	0.0089	0.0191	0.0369	0.0655
17.80	0.0000	0.0000	0.0000	0.0001	0.0004	0.0012	0.0033	0.0079	0.0171	0.0335	0.0600
18.00	0.0000	0.0000	0.0000	0.0001	0.0003	0.0010	0.0029	0.0071	0.0154	0.0304	0.0549
18.20	0.0000	0.0000	0.0000	0.0001	0.0003	0.0009	0.0025	0.0063	0.0138	0.0275	0.0502
18.40	0.0000	0.0000	0.0000	0.0001	0.0002	0.0008	0.0022	0.0056	0.0124	0.0249	0.0458
18.60	0.0000	0.0000	0.0000	0.0001	0.0002	0.0007	0.0020	0.0049	0.0111	0.0225	0.0418
18.80	0.0000	0.0000	0.0000	0.0000	0.0002	0.0006	0.0017	0.0044	0.0099	0.0203	0.0381
19.00	0.0000	0.0000	0.0000	0.0000	0.0002	0.0005	0.0015	0.0039	0.0089	0.0183	0.0347
19.20	0.0000	0.0000	0.0000	0.0000	0.0001	0.0005	0.0013	0.0034	0.0079	0.0165	0.0315
19.40	0.0000	0.0000	0.0000	0.0000	0.0001	0.0004	0.0012	0.0030	0.0071	0.0149	0.0287
19.60	0.0000	0.0000	0.0000	0.0000	0.0001	0.0003	0.0010	0.0027	0.0063	0.0134	0.0260
19.80	0.0000	0.0000	0.0000	0.0000	0.0001	0.0003	0.0009	0.0024	0.0056	0.0120	0.0236
20.00	0.0000	0.0000	0.0000	0.0000	0.0001	0.0003	0.0008	0.0021	0.0050	0.0108	0.0214

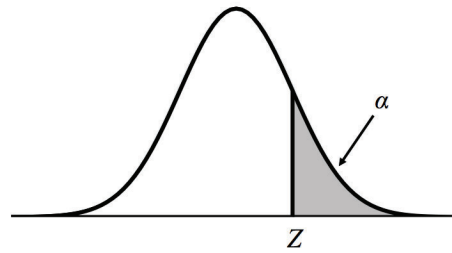
μ	$r =$	12	13	14	15	16	17	18	19	20	21	22
11.00	0.6887	0.7813	0.8540	0.9074	0.9441	0.9678	0.9823	0.9907	0.9953	0.9977	0.9990	
11.20	0.6666	0.7624	0.8391	0.8963	0.9364	0.9628	0.9792	0.9889	0.9943	0.9972	0.9987	
11.40	0.6442	0.7430	0.8234	0.8845	0.9280	0.9572	0.9757	0.9868	0.9932	0.9966	0.9984	
11.60	0.6216	0.7230	0.8069	0.8719	0.9190	0.9511	0.9718	0.9845	0.9918	0.9958	0.9980	
11.80	0.5988	0.7025	0.7898	0.8585	0.9092	0.9444	0.9674	0.9818	0.9902	0.9950	0.9975	
12.00	0.5760	0.6815	0.7720	0.8444	0.8987	0.9370	0.9626	0.9787	0.9884	0.9939	0.9970	
12.20	0.5531	0.6603	0.7536	0.8296	0.8875	0.9290	0.9572	0.9753	0.9863	0.9927	0.9963	
12.40	0.5303	0.6387	0.7347	0.8140	0.8755	0.9204	0.9513	0.9715	0.9840	0.9914	0.9955	
12.60	0.5077	0.6169	0.7153	0.7978	0.8629	0.9111	0.9448	0.9672	0.9813	0.9898	0.9946	
12.80	0.4853	0.5950	0.6954	0.7810	0.8495	0.9011	0.9378	0.9625	0.9783	0.9880	0.9936	
13.00	0.4631	0.5730	0.6751	0.7636	0.8355	0.8905	0.9302	0.9573	0.9750	0.9859	0.9924	
13.20	0.4413	0.5511	0.6546	0.7456	0.8208	0.8791	0.9219	0.9516	0.9713	0.9836	0.9910	
13.40	0.4199	0.5292	0.6338	0.7272	0.8054	0.8671	0.9130	0.9454	0.9671	0.9810	0.9894	
13.60	0.3989	0.5074	0.6128	0.7083	0.7895	0.8545	0.9035	0.9387	0.9626	0.9780	0.9876	
13.80	0.3784	0.4858	0.5916	0.6890	0.7730	0.8411	0.8934	0.9314	0.9576	0.9748	0.9856	
14.00	0.3585	0.4644	0.5704	0.6694	0.7559	0.8272	0.8826	0.9235	0.9521	0.9712	0.9833	
14.20	0.3391	0.4434	0.5492	0.6494	0.7384	0.8126	0.8712	0.9150	0.9461	0.9671	0.9807	
14.40	0.3203	0.4227	0.5281	0.6293	0.7204	0.7975	0.8592	0.9060	0.9396	0.9627	0.9779	
14.60	0.3021	0.4024	0.5071	0.6090	0.7020	0.7818	0.8466	0.8963	0.9326	0.9579	0.9747	
14.80	0.2845	0.3826	0.4863	0.5886	0.6832	0.7656	0.8333	0.8861	0.9251	0.9526	0.9711	
15.00	0.2676	0.3632	0.4657	0.5681	0.6641	0.7489	0.8195	0.8752	0.9170	0.9469	0.9673	
15.20	0.2514	0.3444	0.4453	0.5476	0.6448	0.7317	0.8051	0.8638	0.9084	0.9407	0.9630	
15.40	0.2358	0.3260	0.4253	0.5272	0.6253	0.7141	0.7901	0.8517	0.8992	0.9340	0.9583	
15.60	0.2209	0.3083	0.4056	0.5069	0.6056	0.6962	0.7747	0.8391	0.8894	0.9268	0.9532	
15.80	0.2067	0.2911	0.3864	0.4867	0.5858	0.6779	0.7587	0.8260	0.8791	0.9190	0.9477	
16.00	0.1931	0.2745	0.3675	0.4667	0.5660	0.6593	0.7423	0.8122	0.8682	0.9108	0.9418	
16.20	0.1802	0.2585	0.3492	0.4470	0.5461	0.6406	0.7255	0.7980	0.8567	0.9020	0.9353	
16.40	0.1680	0.2432	0.3313	0.4276	0.5263	0.6216	0.7084	0.7833	0.8447	0.8927	0.9284	
16.60	0.1564	0.2285	0.3139	0.4085	0.5067	0.6025	0.6908	0.7681	0.8321	0.8828	0.9210	
16.80	0.1454	0.2144	0.2971	0.3898	0.4871	0.5833	0.6730	0.7524	0.8191	0.8724	0.9131	
17.00	0.1350	0.2009	0.2808	0.3715	0.4677	0.5640	0.6550	0.7363	0.8055	0.8615	0.9047	
17.20	0.1252	0.1880	0.2651	0.3535	0.4486	0.5448	0.6367	0.7199	0.7914	0.8500	0.8958	
17.40	0.1160	0.1758	0.2500	0.3361	0.4297	0.5256	0.6182	0.7031	0.7769	0.8380	0.8864	
17.60	0.1074	0.1641	0.2354	0.3191	0.4112	0.5065	0.5996	0.6859	0.7619	0.8255	0.8765	
17.80	0.0993	0.1531	0.2215	0.3026	0.3929	0.4875	0.5810	0.6685	0.7465	0.8126	0.8660	
18.00	0.0917	0.1426	0.2081	0.2867	0.3751	0.4686	0.5622	0.6509	0.7307	0.7991	0.8551	
18.20	0.0846	0.1327	0.1953	0.2712	0.3576	0.4500	0.5435	0.6331	0.7146	0.7852	0.8436	
18.40	0.0779	0.1233	0.1830	0.2563	0.3405	0.4317	0.5249	0.6151	0.6981	0.7709	0.8317	
18.60	0.0717	0.1145	0.1714	0.2419	0.3239	0.4136	0.5063	0.5970	0.6814	0.7561	0.8193	
18.80	0.0659	0.1062	0.1603	0.2281	0.3077	0.3958	0.4878	0.5788	0.6644	0.7410	0.8065	
19.00	0.0606	0.0984	0.1497	0.2148	0.2920	0.3784	0.4695	0.5606	0.6472	0.7255	0.7931	
19.20	0.0556	0.0911	0.1397	0.2021	0.2768	0.3613	0.4514	0.5424	0.6298	0.7097	0.7794	
19.40	0.0509	0.0842	0.1303	0.1899	0.2621	0.3446	0.4335	0.5242	0.6122	0.6935	0.7653	
19.60	0.0467	0.0778	0.1213	0.1782	0.2479	0.3283	0.4158	0.5061	0.5946	0.6772	0.7507	
19.80	0.0427	0.0717	0.1128	0.1671	0.2342	0.3124	0.3985	0.4881	0.5769	0.6605	0.7358	
20.00	0.0390	0.0661	0.1049	0.1565	0.2211	0.2970	0.3814	0.4703	0.5591	0.6437	0.7206	

μ	$r =$										
	23	24	25	26	27	28	29	30	31	32	33
11.00	0.9995	0.9998	0.9999								
11.20	0.9994	0.9997	0.9999								
11.40	0.9992	0.9997	0.9999	0.9999							
11.60	0.9991	0.9996	0.9998	0.9999							
11.80	0.9988	0.9995	0.9998	0.9999							
12.00	0.9985	0.9993	0.9997	0.9999	0.9999						
12.20	0.9982	0.9991	0.9996	0.9998	0.9999						
12.40	0.9978	0.9989	0.9995	0.9998	0.9999						
12.60	0.9973	0.9987	0.9994	0.9997	0.9999	0.9999					
12.80	0.9967	0.9984	0.9992	0.9996	0.9998	0.9999					
13.00	0.9960	0.9980	0.9990	0.9995	0.9998	0.9999					
13.20	0.9952	0.9976	0.9988	0.9994	0.9997	0.9999					
13.40	0.9943	0.9971	0.9985	0.9993	0.9997	0.9999	0.9999				
13.60	0.9933	0.9965	0.9982	0.9991	0.9996	0.9998	0.9999				
13.80	0.9921	0.9958	0.9978	0.9989	0.9995	0.9998	0.9999				
14.00	0.9907	0.9950	0.9974	0.9987	0.9994	0.9997	0.9999	0.9999			
14.20	0.9891	0.9941	0.9969	0.9984	0.9992	0.9996	0.9998	0.9999			
14.40	0.9873	0.9930	0.9963	0.9981	0.9990	0.9995	0.9998	0.9999			
14.60	0.9853	0.9918	0.9956	0.9977	0.9988	0.9994	0.9997	0.9999	0.9999		
14.80	0.9831	0.9904	0.9947	0.9972	0.9986	0.9993	0.9997	0.9998	0.9999		
15.00	0.9805	0.9888	0.9938	0.9967	0.9983	0.9991	0.9996	0.9998	0.9999		
15.20	0.9777	0.9871	0.9928	0.9961	0.9979	0.9990	0.9995	0.9998	0.9999	0.9999	
15.40	0.9746	0.9851	0.9915	0.9954	0.9975	0.9987	0.9994	0.9997	0.9999	0.9999	
15.60	0.9712	0.9829	0.9902	0.9945	0.9971	0.9985	0.9992	0.9996	0.9998	0.9999	
15.80	0.9674	0.9804	0.9886	0.9936	0.9965	0.9982	0.9991	0.9995	0.9998	0.9999	
16.00	0.9633	0.9777	0.9869	0.9925	0.9959	0.9978	0.9989	0.9994	0.9997	0.9999	0.9999
16.20	0.9588	0.9747	0.9849	0.9913	0.9952	0.9974	0.9986	0.9993	0.9997	0.9998	0.9999
16.40	0.9539	0.9713	0.9828	0.9900	0.9944	0.9969	0.9984	0.9992	0.9996	0.9998	0.9999
16.60	0.9486	0.9677	0.9804	0.9884	0.9934	0.9964	0.9981	0.9990	0.9995	0.9998	0.9999
16.80	0.9429	0.9637	0.9777	0.9867	0.9924	0.9957	0.9977	0.9988	0.9994	0.9997	0.9999
17.00	0.9367	0.9594	0.9748	0.9848	0.9912	0.9950	0.9973	0.9986	0.9993	0.9996	0.9998
17.20	0.9301	0.9546	0.9715	0.9827	0.9898	0.9942	0.9968	0.9983	0.9991	0.9995	0.9998
17.40	0.9230	0.9495	0.9680	0.9804	0.9883	0.9933	0.9962	0.9980	0.9989	0.9994	0.9997
17.60	0.9154	0.9440	0.9641	0.9778	0.9866	0.9922	0.9956	0.9976	0.9987	0.9993	0.9997
17.80	0.9074	0.9381	0.9599	0.9749	0.9848	0.9910	0.9949	0.9972	0.9985	0.9992	0.9996
18.00	0.8989	0.9317	0.9554	0.9718	0.9827	0.9897	0.9941	0.9967	0.9982	0.9990	0.9995
18.20	0.8899	0.9249	0.9505	0.9683	0.9804	0.9882	0.9931	0.9961	0.9979	0.9989	0.9994
18.40	0.8804	0.9177	0.9452	0.9646	0.9779	0.9866	0.9921	0.9955	0.9975	0.9986	0.9993
18.60	0.8704	0.9100	0.9395	0.9606	0.9751	0.9847	0.9909	0.9948	0.9971	0.9984	0.9991
18.80	0.8600	0.9019	0.9334	0.9562	0.9720	0.9827	0.9896	0.9939	0.9966	0.9981	0.9990
19.00	0.8490	0.8933	0.9269	0.9514	0.9687	0.9805	0.9882	0.9930	0.9960	0.9978	0.9988
19.20	0.8376	0.8842	0.9199	0.9463	0.9651	0.9780	0.9865	0.9920	0.9954	0.9974	0.9986
19.40	0.8257	0.8746	0.9126	0.9409	0.9612	0.9753	0.9847	0.9908	0.9946	0.9970	0.9983
19.60	0.8134	0.8646	0.9048	0.9350	0.9570	0.9724	0.9828	0.9895	0.9938	0.9965	0.9980
19.80	0.8007	0.8541	0.8965	0.9288	0.9524	0.9692	0.9806	0.9881	0.9929	0.9959	0.9977
20.00	0.7875	0.8432	0.8878	0.9221	0.9475	0.9657	0.9782	0.9865	0.9919	0.9953	0.9973

μ	$r =$					
	34	35	36	37	38	39
11.00						
11.20						
11.40						
11.60						
11.80						
12.00						
12.20						
12.40						
12.60						
12.80						
13.00						
13.20						
13.40						
13.60						
13.80						
14.00						
14.20						
14.40						
14.60						
14.80						
15.00						
15.20						
15.40						
15.60						
15.80						
16.00						
16.20						
16.40						
16.60	0.9999					
16.80	0.9999					
17.00	0.9999					
17.20	0.9999	0.9999				
17.40	0.9999	0.9999				
17.60	0.9998	0.9999				
17.80	0.9998	0.9999				
18.00	0.9998	0.9999	0.9999			
18.20	0.9997	0.9999	0.9999			
18.40	0.9996	0.9998	0.9999			
18.60	0.9996	0.9998	0.9999	0.9999		
18.80	0.9995	0.9997	0.9999	0.9999		
19.00	0.9994	0.9997	0.9998	0.9999		
19.20	0.9992	0.9996	0.9998	0.9999		
19.40	0.9991	0.9995	0.9998	0.9999	0.9999	
19.60	0.9989	0.9994	0.9997	0.9999	0.9999	
19.80	0.9987	0.9993	0.9996	0.9998	0.9999	
20.00	0.9985	0.9992	0.9996	0.9998	0.9999	0.9999

2.3 Normal Distribution

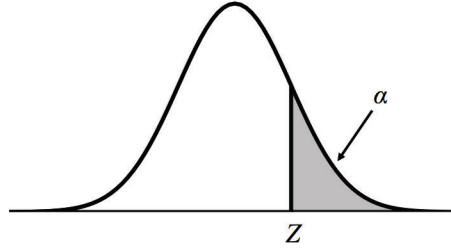
Tabulated values of $P(Z > z)$ where $Z = \frac{x - \mu}{\sigma}$.



z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.5000	0.4960	0.4920	0.4880	0.4840	0.4801	0.4761	0.4721	0.4681	0.4641
0.1	0.4602	0.4562	0.4522	0.4483	0.4443	0.4404	0.4364	0.4325	0.4286	0.4247
0.2	0.4207	0.4168	0.4129	0.4090	0.4052	0.4013	0.3974	0.3936	0.3897	0.3859
0.3	0.3821	0.3783	0.3745	0.3707	0.3669	0.3632	0.3594	0.3557	0.3520	0.3483
0.4	0.3446	0.3409	0.3372	0.3336	0.3300	0.3264	0.3228	0.3192	0.3156	0.3121
0.5	0.3085	0.3050	0.3015	0.2981	0.2946	0.2912	0.2877	0.2843	0.2810	0.2776
0.6	0.2743	0.2709	0.2676	0.2643	0.2611	0.2578	0.2546	0.2514	0.2483	0.2451
0.7	0.2420	0.2389	0.2358	0.2327	0.2296	0.2266	0.2236	0.2206	0.2177	0.2148
0.8	0.2119	0.2090	0.2061	0.2033	0.2005	0.1977	0.1949	0.1922	0.1894	0.1867
0.9	0.1841	0.1814	0.1788	0.1762	0.1736	0.1711	0.1685	0.1660	0.1635	0.1611
1.0	0.1587	0.1562	0.1539	0.1515	0.1492	0.1469	0.1446	0.1423	0.1401	0.1379
1.1	0.1357	0.1335	0.1314	0.1292	0.1271	0.1251	0.1230	0.1210	0.1190	0.1170
1.2	0.1151	0.1131	0.1112	0.1093	0.1075	0.1056	0.1038	0.1020	0.1003	0.0985
1.3	0.0968	0.0951	0.0934	0.0918	0.0901	0.0885	0.0869	0.0853	0.0838	0.0823
1.4	0.0808	0.0793	0.0778	0.0764	0.0749	0.0735	0.0721	0.0708	0.0694	0.0681
1.5	0.0668	0.0655	0.0643	0.0630	0.0618	0.0606	0.0594	0.0582	0.0571	0.0559
1.6	0.0548	0.0537	0.0526	0.0516	0.0505	0.0495	0.0485	0.0475	0.0465	0.0455
1.7	0.0446	0.0436	0.0427	0.0418	0.0409	0.0401	0.0392	0.0384	0.0375	0.0367
1.8	0.0359	0.0351	0.0344	0.0336	0.0329	0.0322	0.0314	0.0307	0.0301	0.0294
1.9	0.0287	0.0281	0.0274	0.0268	0.0262	0.0256	0.0250	0.0244	0.0239	0.0233
2.0	0.0228	0.0222	0.0217	0.0212	0.0207	0.0202	0.0197	0.0192	0.0188	0.0183
2.1	0.0179	0.0174	0.0170	0.0166	0.0162	0.0158	0.0154	0.0150	0.0146	0.0143
2.2	0.0139	0.0136	0.0132	0.0129	0.0125	0.0122	0.0119	0.0116	0.0113	0.0110
2.3	0.0107	0.0104	0.0102	0.0099	0.0096	0.0094	0.0091	0.0089	0.0087	0.0084
2.4	0.0082	0.0080	0.0078	0.0075	0.0073	0.0071	0.0069	0.0068	0.0066	0.0064
2.5	0.0062	0.0060	0.0059	0.0057	0.0055	0.0054	0.0052	0.0051	0.0049	0.0048
2.6	0.0047	0.0045	0.0044	0.0043	0.0041	0.0040	0.0039	0.0038	0.0037	0.0036
2.7	0.0035	0.0034	0.0033	0.0032	0.0031	0.0030	0.0029	0.0028	0.0027	0.0026
2.8	0.0026	0.0025	0.0024	0.0023	0.0023	0.0022	0.0021	0.0021	0.0020	0.0019
2.9	0.0019	0.0018	0.0018	0.0017	0.0016	0.0016	0.0015	0.0015	0.0014	0.0014
3.0	0.0013	0.0013	0.0013	0.0012	0.0012	0.0011	0.0011	0.0011	0.0010	0.0010
3.1	0.0010	0.0009	0.0009	0.0009	0.0008	0.0008	0.0008	0.0008	0.0007	0.0007
3.2	0.0007	0.0007	0.0006	0.0006	0.0006	0.0006	0.0006	0.0005	0.0005	0.0005
3.3	0.0005	0.0005	0.0005	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0003
3.4	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0002
3.5	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
3.6	0.0002	0.0002	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
3.7	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
3.8	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001

2.4 Inverse Normal Distribution

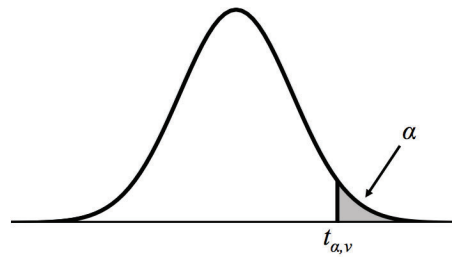
Tabulated values of Z where $\alpha = P(Z > z)$.



α	z	α	z	α	z	α	z
0.50	0.0000	0.25	0.6745	0.050	1.6449	0.013	2.2262
0.49	0.0251	0.24	0.7063	0.048	1.6646	0.012	2.2571
0.48	0.0502	0.23	0.7388	0.046	1.6849	0.011	2.2904
0.47	0.0753	0.22	0.7722	0.044	1.7060	0.010	2.3263
0.46	0.1004	0.21	0.8064	0.042	1.7279	0.009	2.3656
0.45	0.1257	0.20	0.8416	0.040	1.7507	0.008	2.4089
0.44	0.1510	0.19	0.8779	0.038	1.7744	0.007	2.4573
0.43	0.1764	0.18	0.9154	0.036	1.7991	0.006	2.5121
0.42	0.2019	0.17	0.9542	0.034	1.8250	0.005	2.5758
0.41	0.2275	0.16	0.9945	0.032	1.8522	0.004	2.6521
0.40	0.2533	0.15	1.0364	0.030	1.8808	0.003	2.7478
0.39	0.2793	0.14	1.0803	0.028	1.9110	0.002	2.8782
0.38	0.3055	0.13	1.1264	0.026	1.9431	0.001	3.0902
0.37	0.3319	0.12	1.1750	0.025	1.9600	0.0009	3.1214
0.36	0.3585	0.11	1.2265	0.024	1.9774	0.0008	3.1559
0.35	0.3853	0.10	1.2816	0.022	2.0141	0.0007	3.1947
0.34	0.4125	0.09	1.3408	0.020	2.0537	0.0006	3.2389
0.33	0.4399	0.08	1.4051	0.019	2.0749	0.0005	3.2905
0.32	0.4677	0.07	1.4758	0.018	2.0969	0.0004	3.3528
0.31	0.4959	0.06	1.5548	0.017	2.1201	0.0003	3.4316
0.30	0.5244			0.016	2.1444	0.0002	3.5401
0.29	0.5534			0.015	2.1701	0.0001	3.7190
0.28	0.5828			0.014	2.1973	0.00005	3.8906
0.27	0.6128						
0.26	0.6433						

2.5 *t* Distribution

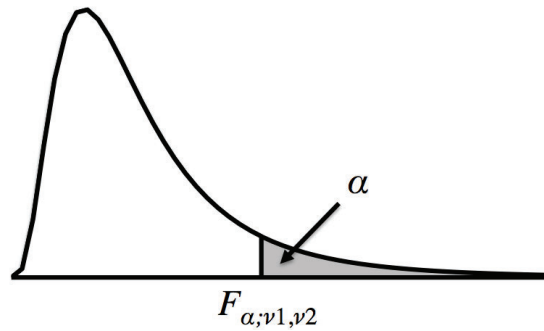
The table gives the value of test statistic for the one-tailed *t*-test with ν degrees of freedom which is exceeded with a probability α .



Significance level for one-tailed test							
	0.1	0.05	0.025	0.01	0.005	0.001	0.0005
Significance level for two-tailed test							
ν	0.2	0.1	0.05	0.02	0.01	0.002	0.001
1	3.0777	6.3138	12.7062	31.8205	63.6567	318.3088	636.6192
2	1.8856	2.9200	4.3027	6.9646	9.9248	22.3271	31.5991
3	1.6377	2.3534	3.1824	4.5407	5.8409	10.2145	12.9240
4	1.5332	2.1318	2.7764	3.7469	4.6041	7.1732	8.6103
5	1.4759	2.0150	2.5706	3.3649	4.0321	5.8934	6.8688
6	1.4398	1.9432	2.4469	3.1427	3.7074	5.2076	5.9588
7	1.4149	1.8946	2.3646	2.9980	3.4995	4.7853	5.4079
8	1.3968	1.8595	2.3060	2.8965	3.3554	4.5008	5.0413
9	1.3830	1.8331	2.2622	2.8214	3.2498	4.2968	4.7809
10	1.3722	1.8125	2.2281	2.7638	3.1693	4.1437	4.5869
11	1.3634	1.7959	2.2010	2.7181	3.1058	4.0247	4.4370
12	1.3562	1.7823	2.1788	2.6810	3.0545	3.9296	4.3178
13	1.3502	1.7709	2.1604	2.6503	3.0123	3.8520	4.2208
14	1.3450	1.7613	2.1448	2.6245	2.9768	3.7874	4.1405
15	1.3406	1.7531	2.1314	2.6025	2.9467	3.7328	4.0728
16	1.3368	1.7459	2.1199	2.5835	2.9208	3.6862	4.0150
17	1.3334	1.7396	2.1098	2.5669	2.8982	3.6458	3.9651
18	1.3304	1.7341	2.1009	2.5524	2.8784	3.6105	3.9216
19	1.3277	1.7291	2.0930	2.5395	2.8609	3.5794	3.8834
20	1.3253	1.7247	2.0860	2.5280	2.8453	3.5518	3.8495
21	1.3232	1.7207	2.0796	2.5176	2.8314	3.5272	3.8193
22	1.3212	1.7171	2.0739	2.5083	2.8188	3.5050	3.7921
23	1.3195	1.7139	2.0687	2.4999	2.8073	3.4850	3.7676
24	1.3178	1.7109	2.0639	2.4922	2.7969	3.4668	3.7454
25	1.3163	1.7081	2.0595	2.4851	2.7874	3.4502	3.7251
26	1.3150	1.7056	2.0555	2.4786	2.7787	3.4350	3.7066
27	1.3137	1.7033	2.0518	2.4727	2.7707	3.4210	3.6896
28	1.3125	1.7011	2.0484	2.4671	2.7633	3.4082	3.6739
29	1.3114	1.6991	2.0452	2.4620	2.7564	3.3962	3.6594
30	1.3104	1.6973	2.0423	2.4573	2.7500	3.3852	3.6460
40	1.3031	1.6839	2.0211	2.4233	2.7045	3.3069	3.5510
50	1.2987	1.6759	2.0086	2.4033	2.6778	3.2614	3.4960
60	1.2958	1.6706	2.0003	2.3901	2.6603	3.2317	3.4602
70	1.2938	1.6669	1.9944	2.3808	2.6479	3.2108	3.4350
80	1.2922	1.6641	1.9901	2.3739	2.6387	3.1953	3.4163
90	1.2910	1.6620	1.9867	2.3685	2.6316	3.1833	3.4019
100	1.2901	1.6602	1.9840	2.3642	2.6259	3.1737	3.3905
∞	1.2816	1.6448	1.9600	2.3263	2.5758	3.0902	3.2905

2.6 F Distribution

The table gives the value for F with ν_1 degrees of freedom in the numerator and ν_2 degrees of freedom in the denominator which is exceeded with probability α . For each ν_1 , ν_2 , F is tabulated for $\alpha = 0.05, 0.025, 0.01, 0.005$ and 0.0001 . $F_{1-\alpha;\nu_1\nu_2} = 1/F_{\alpha;\nu_2\nu_1}$



ν_2	$\nu_1 =$	1	2	3	4	5	6	7	8	9	10
1	1	161	199	216	225	230	234	237	239	241	242
	648	799	864	900	922	937	948	957	963	969	969
	4052	4999	5403	5625	5764	5859	5928	5981	6022	6056	6056
	16211	19999	21615	22500	23056	23437	23715	23925	24091	24224	24224
	405284	499999	540379	562500	576405	585937	592873	598144	602284	605621	605621
2	18.51	19.00	19.16	19.25	19.30	19.33	19.35	19.37	19.38	19.40	19.40
	38.51	39.00	39.17	39.25	39.30	39.33	39.36	39.37	39.39	39.40	39.40
	98.50	99.00	99.17	99.25	99.30	99.33	99.36	99.37	99.39	99.40	99.40
	198.50	199.00	199.17	199.25	199.30	199.33	199.36	199.37	199.39	199.40	199.40
	998.50	999.00	999.17	999.25	999.30	999.33	999.36	999.37	999.39	999.40	999.40
3	10.13	9.55	9.28	9.12	9.01	8.94	8.89	8.85	8.81	8.79	8.79
	17.44	16.04	15.44	15.10	14.88	14.73	14.62	14.54	14.47	14.42	14.42
	34.12	30.82	29.46	28.71	28.24	27.91	27.67	27.49	27.35	27.23	27.23
	55.55	49.80	47.47	46.19	45.39	44.84	44.43	44.13	43.88	43.69	43.69
	167.03	148.50	141.11	137.10	134.58	132.85	131.58	130.62	129.86	129.25	129.25
4	7.71	6.94	6.59	6.39	6.26	6.16	6.09	6.04	6.00	5.96	5.96
	12.22	10.65	9.98	9.60	9.36	9.20	9.07	8.98	8.90	8.84	8.84
	21.20	18.00	16.69	15.98	15.52	15.21	14.98	14.80	14.66	14.55	14.55
	31.33	26.28	24.26	23.15	22.46	21.97	21.62	21.35	21.14	20.97	20.97
	74.14	61.25	56.18	53.44	51.71	50.53	49.66	49.00	48.47	48.05	48.05
5	6.61	5.79	5.41	5.19	5.05	4.95	4.88	4.82	4.77	4.74	4.74
	10.01	8.43	7.76	7.39	7.15	6.98	6.85	6.76	6.68	6.62	6.62
	16.26	13.27	12.06	11.39	10.97	10.67	10.46	10.29	10.16	10.05	10.05
	22.78	18.31	16.53	15.56	14.94	14.51	14.20	13.96	13.77	13.62	13.62
	47.18	37.12	33.20	31.09	29.75	28.83	28.16	27.65	27.24	26.92	26.92
6	5.99	5.14	4.76	4.53	4.39	4.28	4.21	4.15	4.10	4.06	4.06
	8.81	7.26	6.60	6.23	5.99	5.82	5.70	5.60	5.52	5.46	5.46
	13.75	10.92	9.78	9.15	8.75	8.47	8.26	8.10	7.98	7.87	7.87
	18.63	14.54	12.92	12.03	11.46	11.07	10.79	10.57	10.39	10.25	10.25
	35.51	27.00	23.70	21.92	20.80	20.03	19.46	19.03	18.69	18.41	18.41

v_2	$v_1 =$ 1	2	3	4	5	6	7	8	9	10
7	5.59	4.74	4.35	4.12	3.97	3.87	3.79	3.73	3.68	3.64
	8.07	6.54	5.89	5.52	5.29	5.12	4.99	4.90	4.82	4.76
	12.25	9.55	8.45	7.85	7.46	7.19	6.99	6.84	6.72	6.62
	16.24	12.40	10.88	10.05	9.52	9.16	8.89	8.68	8.51	8.38
	29.25	21.69	18.77	17.20	16.21	15.52	15.02	14.63	14.33	14.08
8	5.32	4.46	4.07	3.84	3.69	3.58	3.50	3.44	3.39	3.35
	7.57	6.06	5.42	5.05	4.82	4.65	4.53	4.43	4.36	4.30
	11.26	8.65	7.59	7.01	6.63	6.37	6.18	6.03	5.91	5.81
	14.69	11.04	9.60	8.81	8.63	7.95	7.69	7.50	7.34	7.21
	25.41	18.49	15.83	14.39	13.63	12.86	12.40	12.05	11.77	11.54
9	5.12	4.26	3.86	3.63	3.48	3.37	3.29	3.23	3.18	3.14
	7.21	5.71	5.08	4.72	4.48	4.32	4.20	4.10	4.03	3.96
	10.56	8.02	6.99	6.42	6.06	5.80	5.61	5.47	5.35	5.26
	13.61	10.11	8.72	7.96	7.47	7.13	6.88	6.69	6.54	6.42
	22.86	16.39	13.90	12.56	11.71	11.13	10.70	10.37	10.11	9.89
10	4.96	4.10	3.71	3.48	3.33	3.22	3.14	3.07	3.02	2.98
	6.94	5.46	4.83	4.47	4.24	4.07	3.95	3.85	3.78	3.72
	10.04	7.56	6.55	5.99	5.64	5.39	5.20	5.06	4.94	4.85
	12.83	9.43	8.08	7.34	6.87	6.54	6.30	6.12	5.97	5.85
	21.04	14.91	12.55	11.28	10.48	9.93	9.52	9.20	8.96	8.75
12	4.75	3.89	3.49	3.26	3.11	3.00	2.91	2.85	2.80	2.75
	6.55	5.10	4.47	4.12	3.89	3.73	3.61	3.51	3.44	3.37
	9.33	6.93	5.95	5.41	5.06	4.82	4.64	4.50	4.39	4.30
	11.75	8.51	7.23	6.52	6.07	5.76	5.52	5.35	5.20	5.09
	18.64	12.97	10.80	9.63	8.89	8.38	8.00	7.71	7.48	7.29
14	4.60	3.74	3.34	3.11	2.96	2.85	2.76	2.70	2.65	2.60
	6.30	4.86	4.24	3.89	3.66	3.50	3.38	3.29	3.21	3.15
	8.86	6.51	5.56	5.04	4.69	4.46	4.28	4.14	4.03	3.94
	11.06	7.92	6.68	6.00	5.56	5.26	5.03	4.86	4.72	4.60
	17.14	11.78	9.73	8.62	7.92	7.44	7.08	6.80	6.58	6.40
16	4.49	3.63	3.24	3.01	2.85	2.74	2.66	2.59	2.54	2.49
	6.12	4.69	4.08	3.73	3.50	3.34	3.22	3.12	3.05	2.99
	8.53	6.23	5.29	4.77	4.44	4.20	4.03	3.89	3.78	3.69
	10.58	7.51	6.30	5.64	5.21	4.91	4.69	4.52	4.38	4.27
	16.12	10.97	9.01	7.94	7.27	6.80	6.46	6.19	5.98	5.81
18	4.41	3.55	3.16	2.93	2.77	2.66	2.58	2.51	2.46	2.41
	5.98	4.56	3.95	3.61	3.38	3.22	3.10	3.01	2.93	2.87
	8.29	6.01	5.09	4.58	4.25	4.01	3.84	3.71	3.60	3.51
	10.22	7.21	6.03	5.37	4.96	4.66	4.44	4.28	4.14	4.03
	15.38	10.39	8.49	7.46	6.81	6.35	6.02	5.76	5.56	5.39
20	4.35	3.49	3.10	2.87	2.71	2.60	2.51	2.45	2.39	2.35
	5.87	4.46	3.86	3.51	3.29	3.13	3.01	2.91	2.84	2.77
	8.10	5.85	4.94	4.43	4.10	3.87	3.70	3.56	3.46	3.37
	9.94	6.99	5.82	5.17	4.76	4.47	4.26	4.09	3.96	3.85
	14.82	9.95	8.10	7.10	6.46	6.02	5.69	5.44	5.24	5.08

v_2	$v_1 =$ 1	2	3	4	5	6	7	8	9	10
30	4.17	3.32	2.92	2.69	2.53	2.42	2.33	2.27	2.21	2.16
	5.57	4.18	3.59	3.25	3.03	2.87	2.75	2.65	2.57	2.51
	7.56	5.39	4.51	4.02	3.70	3.47	3.30	3.17	3.07	2.98
	9.18	6.35	5.24	4.62	4.23	3.95	3.74	3.58	3.45	3.34
	13.29	8.77	7.05	6.12	5.53	5.12	4.82	4.58	4.39	4.24
40	4.08	3.23	2.84	2.61	2.45	2.34	2.25	2.18	2.12	2.08
	5.42	4.05	3.46	3.13	2.90	2.74	2.62	2.53	2.45	2.39
	7.31	5.18	4.31	3.83	3.51	3.29	3.12	2.99	2.89	2.80
	8.83	6.07	4.98	4.37	3.99	3.71	3.51	3.35	3.22	3.12
	12.61	8.25	6.59	5.70	5.13	4.73	4.44	4.21	4.02	3.87
50	4.03	3.18	2.79	2.56	2.40	2.29	2.20	2.13	2.07	2.03
	5.34	3.97	3.39	3.05	2.83	2.67	2.55	2.46	2.38	2.32
	7.17	5.06	4.20	3.72	3.41	3.19	3.02	2.89	2.78	2.70
	8.63	5.90	4.83	4.23	3.85	3.58	3.38	3.22	3.09	2.99
	12.22	7.96	6.34	5.46	4.90	4.51	4.22	4.00	3.82	3.67
60	4.00	3.15	2.76	2.53	2.37	2.25	2.17	2.10	2.04	1.99
	5.29	3.93	3.34	3.01	2.79	2.63	2.51	2.41	2.33	2.27
	7.08	4.98	4.13	3.65	3.34	3.12	2.95	2.82	2.72	2.63
	8.49	5.79	4.73	4.14	3.76	3.49	3.29	3.13	3.01	2.90
	11.97	7.77	6.17	5.31	4.76	4.37	4.09	3.86	3.69	3.54
70	3.98	3.13	2.74	2.50	2.35	2.23	2.14	2.07	2.02	1.97
	5.25	3.89	3.31	2.97	2.75	2.59	2.47	2.38	2.30	2.24
	7.01	4.92	4.07	3.60	3.29	3.07	2.91	2.78	2.67	2.59
	8.40	5.72	4.66	4.08	3.70	3.43	3.23	3.08	2.95	2.85
	11.80	7.64	6.06	5.20	4.66	4.28	3.99	3.77	3.60	3.45
80	3.96	3.11	2.72	2.49	2.33	2.21	2.13	2.06	2.00	1.95
	5.22	3.86	3.28	2.95	2.73	2.57	2.45	2.35	2.28	2.21
	6.96	4.88	4.04	3.56	3.26	3.04	2.87	2.74	2.64	2.55
	8.33	5.67	4.61	4.03	3.65	3.39	3.19	3.03	2.91	2.80
	11.67	7.54	5.97	5.12	4.58	4.20	3.92	3.70	3.53	3.39
90	3.95	3.10	2.71	2.47	2.32	2.20	2.11	2.04	1.99	1.94
	5.20	3.84	3.26	2.93	2.71	2.55	2.43	2.34	2.26	2.19
	6.93	4.85	4.01	3.53	3.23	3.01	2.84	2.72	2.61	2.52
	8.28	5.62	4.57	3.99	3.62	3.35	3.15	3.00	2.87	2.77
	11.57	7.47	5.91	5.06	4.53	4.15	3.87	3.65	3.48	3.34
100	3.94	3.09	2.70	2.46	2.31	2.19	2.10	2.03	1.97	1.93
	5.18	3.83	3.25	2.92	2.70	2.54	2.42	2.32	2.24	2.18
	6.90	4.82	3.98	3.51	3.21	2.99	2.82	2.69	2.59	2.50
	8.24	5.59	4.54	3.96	3.59	3.33	3.13	2.97	2.85	2.74
	11.50	7.41	5.86	5.02	4.48	4.11	3.83	3.61	3.44	3.30

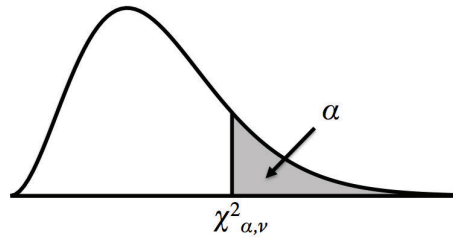
v_2	$v_1 =$ 12	14	16	18	20	22	24	26	28	30
1	244	245	246	247	248	249	249	249	250	250
	977	983	987	990	993	995	997	999	1000	1001
	6106	6143	6170	6192	6209	6223	6235	6245	6253	6261
	24426	24572	24681	24767	24836	24892	24940	24980	25014	25044
	610668	614303	617045	619188	620908	622319	623497	624497	625354	626099
2	19.41	19.42	19.43	19.44	19.45	19.45	19.45	19.46	19.46	19.46
	39.41	39.43	39.44	39.44	39.45	39.45	39.46	39.46	39.46	39.46
	99.42	99.43	99.44	99.44	99.45	99.45	99.46	99.46	99.46	99.47
	199.42	199.43	199.44	199.44	199.45	199.45	199.46	199.46	199.46	199.47
	999.42	999.43	999.44	999.44	999.45	999.45	999.46	999.46	999.46	999.47
3	8.74	8.71	8.69	8.67	8.66	8.65	8.64	8.63	8.62	8.62
	14.34	14.28	14.23	14.20	14.17	14.14	14.12	14.11	14.09	14.08
	27.05	26.92	26.83	26.75	26.69	26.64	26.60	26.56	26.53	26.50
	43.39	43.17	43.01	42.88	42.78	42.69	42.62	42.56	42.51	42.47
	128.32	127.64	127.14	126.74	126.42	126.15	125.93	125.75	125.59	125.45
4	5.91	5.87	5.84	5.82	5.80	5.79	5.77	5.76	5.75	5.75
	8.75	8.68	8.63	8.59	8.56	8.53	8.51	8.49	8.48	8.46
	14.37	14.25	14.15	14.08	14.02	13.97	13.93	13.89	13.86	13.84
	20.70	20.51	20.37	20.26	20.17	20.09	20.03	19.98	19.93	19.89
	47.41	46.95	46.60	46.32	46.10	45.92	45.77	45.64	45.53	45.43
5	4.68	4.64	4.60	4.58	4.56	4.54	4.53	4.52	4.50	4.50
	6.52	6.46	6.40	6.36	6.33	6.30	6.28	6.26	6.24	6.23
	9.89	9.77	9.68	9.61	9.55	9.51	9.47	9.43	9.40	9.38
	13.38	13.21	13.09	12.98	12.90	12.84	12.78	12.73	12.69	12.66
	26.42	26.06	25.78	25.57	25.39	25.25	25.13	25.03	24.94	24.87
6	4.00	3.96	3.92	3.90	3.87	3.86	3.84	3.83	3.82	3.81
	5.37	5.30	5.24	5.20	5.17	5.14	5.12	5.10	5.08	5.07
	7.72	7.60	7.52	7.45	7.40	7.35	7.31	7.28	7.25	7.23
	10.03	9.88	9.76	9.66	9.59	9.53	9.47	9.43	9.39	9.36
	17.99	17.68	17.45	17.27	17.12	17.00	16.90	16.81	16.74	16.67
7	3.57	3.53	3.49	3.47	3.44	3.43	3.41	3.40	3.39	3.38
	4.67	4.60	4.54	4.50	4.47	4.44	4.41	4.39	4.38	4.36
	6.47	6.36	6.28	6.21	6.16	6.11	6.07	6.04	6.02	5.99
	8.18	8.03	7.91	7.83	7.75	7.69	7.64	7.60	7.57	7.53
	13.71	13.43	13.23	13.06	12.93	12.82	12.73	12.65	12.59	12.53
8	3.28	3.24	3.20	3.17	3.15	3.13	3.12	3.10	3.09	3.08
	4.20	4.13	4.08	4.03	4.00	3.97	3.95	3.93	3.91	3.89
	5.67	5.56	5.48	5.41	5.36	5.32	5.28	5.25	5.22	5.20
	7.01	6.87	6.76	6.68	6.61	6.55	6.50	6.46	6.43	6.40
	11.19	10.94	10.75	10.60	10.48	10.38	10.30	10.22	10.16	10.11
9	3.07	3.03	2.99	2.96	2.94	2.92	2.90	2.89	2.87	2.86
	3.87	3.80	3.74	3.70	3.67	3.64	3.61	3.59	3.58	3.56
	5.11	5.01	4.92	4.86	4.81	4.77	4.73	4.70	4.67	4.65
	6.23	6.09	5.98	5.90	5.83	5.78	5.73	5.69	5.65	5.62
	9.57	9.33	9.15	9.01	8.90	8.80	8.72	8.66	8.60	8.55

v_2	$v_1 =$ 12	14	16	18	20	22	24	26	28	30
10	2.91	2.86	2.83	2.80	2.77	2.75	2.74	2.72	2.71	2.70
	3.62	3.55	3.50	3.45	3.42	3.39	3.37	3.34	3.33	3.31
	4.71	4.60	4.52	4.46	4.41	4.36	4.33	4.30	4.27	4.25
	5.66	5.53	5.42	5.34	5.27	5.22	5.17	5.13	5.10	5.07
	8.45	8.22	8.05	7.91	7.80	7.71	7.64	7.57	7.52	7.47
12	2.69	2.64	2.60	2.57	2.54	2.52	2.51	2.49	2.48	2.47
	3.28	3.21	3.15	3.11	3.07	3.04	3.02	3.00	2.98	2.96
	4.16	4.05	3.97	3.91	3.86	3.82	3.78	3.75	3.72	3.70
	4.91	4.77	4.67	4.59	4.53	4.48	4.43	4.39	4.36	4.33
	7.00	6.79	6.63	6.51	6.40	6.32	6.25	6.19	6.14	6.09
14	2.53	2.48	2.44	2.41	2.39	2.37	2.35	2.33	2.32	2.31
	3.05	2.98	2.92	2.88	2.84	2.81	2.79	2.77	2.75	2.73
	3.80	3.70	3.62	3.56	3.51	3.46	3.43	3.40	3.37	3.35
	4.43	4.30	4.20	4.12	4.06	4.01	3.96	3.92	3.89	3.86
	6.13	5.93	5.78	5.66	5.56	5.48	5.41	5.35	5.30	5.25
16	2.42	2.37	2.33	2.30	2.28	2.25	2.24	2.22	2.21	2.19
	2.89	2.82	2.76	2.72	2.68	2.65	2.63	2.60	2.58	2.57
	3.55	3.45	3.37	3.31	3.26	3.22	3.18	3.15	3.12	3.10
	4.10	3.97	3.87	3.80	3.73	3.68	3.64	3.60	3.57	3.54
	5.55	5.35	5.20	5.09	4.99	4.91	4.85	4.79	4.74	4.70
18	2.34	2.29	2.25	2.22	2.19	2.17	2.15	2.13	2.12	2.11
	2.77	2.70	2.64	2.60	2.56	2.53	2.50	2.48	2.46	2.44
	3.37	3.27	3.19	3.13	3.08	3.03	3.00	2.97	2.94	2.92
	3.86	3.73	3.64	3.56	3.50	3.45	3.40	3.36	3.33	3.30
	5.13	4.94	4.80	4.68	4.59	4.51	4.45	4.39	4.34	4.30
20	2.28	2.22	2.18	2.15	2.12	2.10	2.08	2.07	2.05	2.04
	2.68	2.60	2.55	2.50	2.46	2.43	2.41	2.39	2.37	2.35
	3.23	3.13	3.05	2.99	2.94	2.90	2.86	2.83	2.80	2.78
	3.68	3.55	3.46	3.38	3.32	3.27	3.22	3.18	3.15	3.12
	4.82	4.64	4.49	4.38	4.29	4.21	4.15	4.09	4.05	4.00
30	2.09	2.04	1.99	1.96	1.93	1.91	1.89	1.87	1.85	1.84
	2.41	2.34	2.28	2.23	2.20	2.16	2.14	2.11	2.09	2.07
	2.84	2.74	2.66	2.60	2.55	2.51	2.47	2.44	2.41	2.39
	3.18	3.06	2.96	2.89	2.82	2.77	2.73	2.69	2.66	2.63
	4.00	3.82	3.69	3.58	3.49	3.42	3.36	3.30	3.26	3.22
40	2.00	1.95	1.90	1.87	1.84	1.81	1.79	1.77	1.76	1.74
	2.29	2.21	2.15	2.11	2.07	2.03	2.01	1.98	1.96	1.94
	2.66	2.56	2.48	2.42	2.37	2.33	2.29	2.26	2.23	2.20
	2.95	2.83	2.74	2.66	2.60	2.55	2.50	2.46	2.43	2.40
	3.64	3.47	3.34	3.23	3.14	3.07	3.01	2.96	2.91	2.87
50	1.95	1.89	1.85	1.81	1.78	1.76	1.74	1.72	1.70	1.69
	2.22	2.14	2.08	2.03	1.99	1.96	1.93	1.91	1.89	1.87
	2.56	2.46	2.38	2.32	2.27	2.22	2.18	2.15	2.12	2.10
	2.82	2.70	2.61	2.53	2.47	2.42	2.37	2.33	2.30	2.27
	3.44	3.27	3.14	3.04	2.95	2.88	2.82	2.76	2.72	2.68

v_2	$v_1 =$ 12	14	16	18	20	22	24	26	28	30
60	1.92	1.86	1.82	1.78	1.75	1.72	1.70	1.68	1.66	1.65
	2.17	2.09	2.03	1.98	1.94	1.91	1.88	1.86	1.83	1.82
	2.50	2.39	2.31	2.25	2.20	2.15	2.12	2.08	2.05	2.03
	2.74	2.62	2.53	2.45	2.39	2.33	2.29	2.25	2.22	2.19
	3.32	3.15	3.02	2.91	2.83	2.75	2.69	2.64	2.60	2.55
70	1.89	1.84	1.79	1.75	1.72	1.70	1.67	1.65	1.64	1.62
	2.14	2.06	2.00	1.95	1.91	1.88	1.85	1.82	1.80	1.78
	2.45	2.35	2.27	2.20	2.15	2.11	2.07	2.03	2.01	1.98
	2.68	2.56	2.47	2.39	2.33	2.28	2.23	2.19	2.16	2.13
	3.23	3.06	2.93	2.83	2.74	2.67	2.61	2.56	2.51	2.47
80	1.88	1.82	1.77	1.73	1.70	1.68	1.65	1.63	1.62	1.60
	2.11	2.03	1.97	1.92	1.88	1.85	1.82	1.79	1.77	1.75
	2.42	2.31	2.23	2.17	2.12	2.07	2.03	2.00	1.97	1.94
	2.64	2.52	2.43	2.35	2.29	2.23	2.19	2.15	2.11	2.08
	3.16	3.00	2.87	2.76	2.68	2.61	2.54	2.49	2.45	2.41
90	1.86	1.80	1.76	1.72	1.69	1.66	1.64	1.62	1.60	1.59
	2.09	2.02	1.95	1.91	1.86	1.83	1.80	1.77	1.75	1.73
	2.39	2.29	2.21	2.14	2.09	2.04	2.00	1.97	1.94	1.92
	2.61	2.49	2.39	2.32	2.25	2.20	2.15	2.12	2.08	2.05
	3.11	2.95	2.82	2.71	2.63	2.56	2.50	2.44	2.40	2.36
100	1.85	1.79	1.75	1.71	1.68	1.65	1.63	1.61	1.59	1.57
	2.08	2.00	1.94	1.89	1.85	1.81	1.78	1.76	1.74	1.71
	2.37	2.27	2.19	2.12	2.07	2.02	1.98	1.95	1.92	1.89
	2.58	2.46	2.37	2.29	2.23	2.17	2.13	2.09	2.05	2.02
	3.07	2.91	2.78	2.68	2.59	2.52	2.46	2.41	2.36	2.32

2.7 χ^2 Distribution

These tables gives the value of χ^2 with ν degrees of freedom which is exceeded with probability α .



ν	$\alpha =$									
	0.995	0.99	0.975	0.95	0.9	0.1	0.05	0.025	0.01	0.005
1	0.00	0.00	0.00	0.00	0.02	2.71	3.84	5.02	6.63	7.88
2	0.01	0.02	0.05	0.10	0.21	4.61	5.99	7.38	9.21	10.60
3	0.07	0.11	0.22	0.35	0.58	6.25	7.81	9.35	11.34	12.84
4	0.21	0.30	0.48	0.71	1.06	7.78	9.49	11.14	13.28	14.86
5	0.41	0.55	0.83	1.15	1.61	9.24	11.07	12.83	15.09	16.75
6	0.68	0.87	1.24	1.64	2.20	10.64	12.59	14.45	16.81	18.55
7	0.99	1.24	1.69	2.17	2.83	12.02	14.07	16.01	18.48	20.28
8	1.34	1.65	2.18	2.73	3.49	13.36	15.51	17.53	20.09	21.95
9	1.73	2.09	2.70	3.33	4.17	14.68	16.92	19.02	21.67	23.59
10	2.16	2.56	3.25	3.94	4.87	15.99	18.31	20.48	23.21	25.19
11	2.60	3.05	3.82	4.57	5.58	17.28	19.68	21.92	24.72	26.76
12	3.07	3.57	4.40	5.23	6.30	18.55	21.03	23.34	26.22	28.30
13	3.57	4.11	5.01	5.89	7.04	19.81	22.36	24.74	27.69	29.82
14	4.07	4.66	5.63	6.57	7.79	21.06	23.68	26.12	29.14	31.32
15	4.60	5.23	6.26	7.26	8.55	22.31	25.00	27.49	30.58	32.80
16	5.14	5.81	6.91	7.96	9.31	23.54	26.30	28.85	32.00	34.27
17	5.70	6.41	7.56	8.67	10.09	24.77	27.59	30.19	33.41	35.72
18	6.26	7.01	8.23	9.39	10.86	25.99	28.87	31.53	34.81	37.16
19	6.84	7.63	8.91	10.12	11.65	27.20	30.14	32.85	36.19	38.58
20	7.43	8.26	9.59	10.85	12.44	28.41	31.41	34.17	37.57	40.00
21	8.03	8.90	10.28	11.59	13.24	29.62	32.67	35.48	38.93	41.40
22	8.64	9.54	10.98	12.34	14.04	30.81	33.92	36.78	40.29	42.80
23	9.26	10.20	11.69	13.09	14.85	32.01	35.17	38.08	41.64	44.18
24	9.89	10.86	12.40	13.85	15.66	33.20	36.42	39.36	42.98	45.56
25	10.52	11.52	13.12	14.61	16.47	34.38	37.65	40.65	44.31	46.93
26	11.16	12.20	13.84	15.38	17.29	35.56	38.89	41.92	45.64	48.29
27	11.81	12.88	14.57	16.15	18.11	36.74	40.11	43.19	46.96	49.64
28	12.46	13.56	15.31	16.93	18.94	37.92	41.34	44.46	48.28	50.99
29	13.12	14.26	16.05	17.71	19.77	39.09	42.56	45.72	49.59	52.34
30	13.79	14.95	16.79	18.49	20.60	40.26	43.77	46.98	50.89	53.67
31	14.46	15.66	17.54	19.28	21.43	41.42	44.99	48.23	52.19	55.00
32	15.13	16.36	18.29	20.07	22.27	42.58	46.19	49.48	53.49	56.33
33	15.82	17.07	19.05	20.87	23.11	43.75	47.40	50.73	54.78	57.65
34	16.50	17.79	19.81	21.66	23.95	44.90	48.60	51.97	56.06	58.96
35	17.19	18.51	20.57	22.47	24.80	46.06	49.80	53.20	57.34	60.27
36	17.89	19.23	21.34	23.27	25.64	47.21	51.00	54.44	58.62	61.58
37	18.59	19.96	22.11	24.07	26.49	48.36	52.19	55.67	59.89	62.88
38	19.29	20.69	22.88	24.88	27.34	49.51	53.38	56.90	61.16	64.18
39	20.00	21.43	23.65	25.70	28.20	50.66	54.57	58.12	62.43	65.48
40	20.71	22.16	24.43	26.51	29.05	51.81	55.76	59.34	63.69	66.77

v	$\alpha =$									
	0.995	0.99	0.975	0.95	0.9	0.1	0.05	0.025	0.01	0.005
41	21.42	22.91	25.21	27.33	29.91	52.95	56.94	60.56	64.95	68.05
42	22.14	23.65	26.00	28.14	30.77	54.09	58.12	61.78	66.21	69.34
43	22.86	24.40	26.79	28.96	31.63	55.23	59.30	62.99	67.46	70.62
44	23.58	25.15	27.57	29.79	32.49	56.37	60.48	64.20	68.71	71.89
45	24.31	25.90	28.37	30.61	33.35	57.51	61.66	65.41	69.96	73.17
46	25.04	26.66	29.16	31.44	34.22	58.64	62.83	66.62	71.20	74.44
47	25.77	27.42	29.96	32.27	35.08	59.77	64.00	67.82	72.44	75.70
48	26.51	28.18	30.75	33.10	35.95	60.91	65.17	69.02	73.68	76.97
49	27.25	28.94	31.55	33.93	36.82	62.04	66.34	70.22	74.92	78.23
50	27.99	29.71	32.36	34.76	37.69	63.17	67.50	71.42	76.15	79.49
55	31.73	33.57	36.40	38.96	42.06	68.80	73.31	77.38	82.29	85.75
60	35.53	37.48	40.48	43.19	46.46	74.40	79.08	83.30	88.38	91.95
65	39.38	41.44	44.60	47.45	50.88	79.97	84.82	89.18	94.42	98.11
70	43.28	45.44	48.76	51.74	55.33	85.53	90.53	95.02	100.43	104.21
75	47.21	49.48	52.94	56.05	59.79	91.06	96.22	100.84	106.39	110.29
80	51.17	53.54	57.15	60.39	64.28	96.58	101.88	106.63	112.33	116.32
85	55.17	57.63	61.39	64.75	68.78	102.08	107.52	112.39	118.24	122.32
90	59.20	61.75	65.65	69.13	73.29	107.57	113.15	118.14	124.12	128.30
95	63.25	65.90	69.92	73.52	77.82	113.04	118.75	123.86	129.97	134.25
100	67.33	70.06	74.22	77.93	82.36	118.50	124.34	129.56	135.81	140.17
105	71.43	74.25	78.54	82.35	86.91	123.95	129.92	135.25	141.62	146.07
110	75.55	78.46	82.87	86.79	91.47	129.39	135.48	140.92	147.41	151.95
115	79.69	82.68	87.21	91.24	96.04	134.81	141.03	146.57	153.19	157.81
120	83.85	86.92	91.57	95.70	100.62	140.23	146.57	152.21	158.95	163.65

2.8 Pearson's Product Moment Correlation Coefficient

The value of α gives the probability that r exceeds the tabulated value assuming the variables follow a bivariate normal distribution with zero correlation. The degrees of freedom, ν , is two less than the sample size.

ν/α	0.1	0.05	0.025	0.01	0.001
1	0.951	0.988	0.997	1.000	1.000
2	0.800	0.900	0.950	0.980	0.998
3	0.687	0.805	0.878	0.934	0.986
4	0.608	0.729	0.811	0.882	0.963
5	0.551	0.669	0.755	0.833	0.935
6	0.507	0.621	0.707	0.789	0.905
7	0.472	0.582	0.666	0.750	0.875
8	0.443	0.549	0.632	0.715	0.847
9	0.419	0.521	0.602	0.685	0.820
10	0.398	0.497	0.576	0.658	0.795
11	0.380	0.476	0.553	0.634	0.772
12	0.365	0.458	0.532	0.612	0.750
13	0.351	0.441	0.514	0.592	0.730
14	0.338	0.426	0.497	0.574	0.711
15	0.327	0.412	0.482	0.558	0.694
16	0.317	0.400	0.468	0.543	0.678
17	0.308	0.389	0.456	0.529	0.662
18	0.299	0.378	0.444	0.516	0.648
19	0.291	0.369	0.433	0.503	0.635
20	0.284	0.360	0.423	0.492	0.622
21	0.277	0.352	0.413	0.482	0.610
22	0.271	0.344	0.404	0.472	0.599
23	0.265	0.337	0.396	0.462	0.588
24	0.260	0.330	0.388	0.453	0.578
25	0.255	0.323	0.381	0.445	0.568
26	0.250	0.317	0.374	0.437	0.559
27	0.245	0.311	0.367	0.430	0.550
28	0.241	0.306	0.361	0.423	0.541
29	0.237	0.301	0.355	0.416	0.533
30	0.233	0.296	0.349	0.409	0.526
35	0.216	0.275	0.325	0.381	0.492
40	0.202	0.257	0.304	0.358	0.463
45	0.190	0.243	0.288	0.338	0.439
50	0.181	0.231	0.273	0.322	0.419
55	0.172	0.220	0.261	0.307	0.401
60	0.165	0.211	0.250	0.295	0.385
70	0.153	0.195	0.232	0.274	0.358
80	0.143	0.183	0.217	0.257	0.336
90	0.135	0.173	0.205	0.242	0.318
100	0.128	0.164	0.194	0.230	0.303
110	0.122	0.156	0.186	0.220	0.289
120	0.117	0.150	0.178	0.210	0.277
130	0.112	0.144	0.171	0.202	0.267

2.9 Spearman's Rank Correlation Coefficient

Probability for a one-sided test (double for a two-sided test).

sample size	$\alpha =$				
	0.05	0.025	0.01	0.005	0.001
4	1.000				
5	0.900	1.000	1.000		
6	0.829	0.886	0.943	1.000	
7	0.714	0.786	0.893	0.929	1.000
8	0.643	0.738	0.833	0.881	0.952
9	0.600	0.700	0.783	0.833	0.917
10	0.564	0.648	0.745	0.794	0.878

2.10 Control Chart Limits for Sample Range

Sample Range

To obtain the limits multiply σ by the appropriate value of D . To obtain an estimate of σ multiply \bar{w} by the appropriate value of b . Normal distribution is assumed.

Sample size	$D_{0.999}$	$D_{0.975}$	$D_{0.025}$	$D_{0.001}$	b
2	0.002	0.004	3.170	4.654	0.8882
3	0.060	0.303	3.682	5.063	0.5908
4	0.199	0.595	3.984	5.309	0.4857
5	0.367	0.850	4.197	5.484	0.4299
6	0.535	1.066	4.361	5.619	0.3946
7	0.691	1.251	4.494	5.730	0.3698
8	0.835	1.410	4.605	5.823	0.3512
9	0.966	1.550	4.700	5.903	0.3367
10	1.085	1.674	4.784	5.973	0.3249
11	1.193	1.784	4.858	6.031	0.3152
12	1.293	1.884	4.925	6.096	0.3069

Standard Deviation

To obtain the limits multiply σ by the appropriate value of E .

Sample size	$E_{0.999}$	$E_{0.975}$	$E_{0.025}$	$E_{0.001}$
2			2.24	3.29
3	0.03	0.16	1.92	2.63
4	0.09	0.27	1.76	2.33
5	0.15	0.35	1.67	2.15
6	0.20	0.41	1.60	2.03
7	0.25	0.45	1.55	1.93
8	0.29	0.49	1.51	1.86
9	0.33	0.52	1.48	1.81
10	0.36	0.55	1.45	1.76
11	0.38	0.57	1.43	1.73
12	0.41	0.59	1.41	1.69

2.11 Hartley's Test Statistic

5% critical values for Hartley's test statistic

$$H = \frac{\max(s_1^2, s_2^2, \dots, s_k^2)}{\min(s_1^2, s_2^2, \dots, s_k^2)}$$

where k = number of groups and $df = n - 1$.

k df	2	3	4	5	6
2	39.00	87.49	142.49	202.38	266.18
3	15.44	27.76	39.51	50.88	61.98
4	9.60	15.46	20.56	25.21	29.54
5	7.15	10.75	13.72	16.34	18.70
6	5.82	8.36	10.38	12.11	13.64
7	4.99	6.94	8.44	9.70	10.80
8	4.43	6.00	7.19	8.17	9.02
9	4.03	5.34	6.31	7.11	7.79
10	3.72	4.85	5.67	6.34	6.91
11	3.47	4.46	5.18	5.75	6.24
12	3.28	4.16	4.79	5.30	5.72
13	3.12	3.91	4.48	4.93	5.30
14	2.98	3.71	4.22	4.62	4.96
15	2.86	3.53	4.00	4.37	4.67
16	2.76	3.38	3.81	4.15	4.43
17	2.67	3.25	3.65	3.96	4.22
18	2.60	3.14	3.51	3.80	4.04
19	2.53	3.04	3.39	3.66	3.88
20	2.46	2.95	3.28	3.53	3.74
30	2.07	2.40	2.61	2.77	2.90
40	1.88	2.12	2.28	2.40	2.50
60	1.67	1.84	1.96	2.04	2.11
80	1.55	1.70	1.78	1.85	1.90
100	1.48	1.60	1.68	1.73	1.78

2.12 Wilcoxon's Signed Rank Test

The table gives values of W for testing the hypothesis that a sample of size n comes from a symmetrical, continuous distribution with mean zero. W is the largest value such that the probability that Wilcoxon's test statistic $\leq W$ is $\leq \alpha$. Thus $\alpha = 0.05$ is appropriate for a one-sided 5% test and $\alpha = 0.025$ is appropriate for a two-sided 5% test.

n	$\alpha =$				
	0.05	0.025	0.01	0.005	0.001
2	-	-	-	-	-
3	-	-	-	-	-
4	-	-	-	-	-
5	0	-	-	-	-
6	2	0	-	-	-
7	3	2	0	-	-
8	5	3	1	0	-
9	8	5	3	1	-
10	10	8	5	3	0
11	13	10	7	5	1
12	17	13	9	7	2
13	21	17	12	9	4
14	25	21	15	12	6
15	30	25	19	15	8
16	26	29	23	19	11
17	41	34	27	23	14
18	47	40	32	27	18
19	53	46	37	32	21
20	60	52	43	37	26
21	67	58	49	42	30
22	75	65	55	48	35
23	83	73	62	54	40
24	91	81	69	61	45
25	100	89	76	68	51
26	110	98	84	75	58
27	119	107	92	83	64
28	130	116	101	91	71
29	140	126	110	100	79
30	151	137	120	109	86

A “-” indicates that H_0 cannot be rejected for the given sample size and significance level. For $n > 30$, Wilcoxon's test statistic is approximately Normally distributed with

$$\mu = \frac{n(n+1)}{4}$$

and

$$\sigma^2 = \frac{n(n+1)(2n+1)}{24}.$$

2.13 Random Digits

05188	60595	95192	98323	64758	28313	13688	34824	71759	03533
59809	37181	81950	21272	83221	95565	52076	97584	16957	85297
35935	46966	85787	39744	74458	58895	61268	54599	13245	10859
34824	72595	19814	41614	80858	19267	24854	95101	63185	06744
48580	22472	92841	74480	06900	99861	77091	14125	37899	78865
12383	72429	83089	24261	52876	26797	79722	85478	14667	17995
37010	95864	25036	20463	62596	05786	15875	17307	94836	88634
55737	43359	85925	43849	75503	11895	58245	22199	94726	20659
66479	16820	05959	20117	68242	61537	32882	82556	13583	35125
50752	51236	83334	83788	64425	20650	72008	22075	84591	16530
89211	47013	90386	93707	66668	71067	22455	73711	30271	06876
35287	82895	87618	85588	57624	16945	98750	59075	59955	41873
68792	48540	50999	78683	56876	26098	80226	79969	26943	41299
89700	34684	15153	84181	74278	29717	89204	47984	26401	49103
04256	23935	99407	53758	20700	65722	77206	64560	89008	80370
78749	32791	53804	84321	04244	49326	53206	70210	36741	88189
67986	81426	24533	76559	65352	76927	06961	12028	55163	71622
61917	07056	56532	85180	61735	27169	85158	59143	11334	90716
61809	26556	58714	66578	85236	68184	54570	98882	76652	51389
33728	91206	20289	80637	60790	64584	03808	26593	11911	32141
42312	63556	26162	58862	45628	70498	33150	89808	34599	76414
50145	40600	54527	44522	47547	47979	53699	39356	80391	73226
20253	25718	72210	13431	19747	98570	94621	97326	25861	79000
96194	08656	42740	70845	72755	68378	55445	56691	22615	00578
39355	80449	25518	00406	81101	56149	67663	00072	82437	25103
50377	84825	43404	37411	90511	87612	49915	73975	36186	79526
74469	08600	38155	99662	40748	97603	76235	04838	17185	81435
15441	20420	36549	54929	09683	15677	54981	23878	30310	12820
13387	05518	20764	51177	73983	86375	17001	83648	25862	94267
47556	08999	79519	97717	36230	55813	98961	59876	87859	62801
12384	37490	50735	96608	21329	64293	28122	22034	06874	26640
11019	76138	12536	92971	66619	94985	83797	65396	15025	61661
02049	78550	60114	71289	62627	67473	34336	02397	37591	46391
07730	28264	64154	45635	60282	79535	42676	98582	02266	33426
79570	64858	12309	70082	88930	11553	58656	08731	63765	38443
45694	29198	23742	75295	26110	02928	46317	78217	99839	20187
55670	06902	45682	04879	57264	34999	79188	47495	28239	39936
76256	55523	53250	84875	46272	02070	12412	15631	69698	38598
27230	04436	81264	08212	00933	64875	37572	48982	46787	52974
63897	32371	57467	43608	33716	94316	00333	11892	35377	01814
19854	28189	50924	92887	51460	72639	62333	91194	11021	89029
66101	26911	72308	76071	67502	30366	25579	34912	50755	77371
84496	38974	34443	91380	50239	90230	58882	54915	80669	61761
43505	77670	53024	03867	60744	61550	91978	77788	85471	64975
67707	55090	67040	16657	52012	40701	46027	35828	34252	02635

2.14 Random Observations from $N(0, 1)$

-1.2085	-1.8396	0.2204	-0.5019	-1.7400	-0.0868	-0.4435	-0.1717	-1.3750	-0.9189
-1.8427	0.2783	-1.4633	1.2400	1.8816	-1.5663	0.7116	-0.6811	0.5332	0.1946
0.6703	-2.4731	1.1611	2.4794	-0.6571	0.6343	-0.6947	-0.8922	-2.9005	-1.3630
-0.3144	-0.6694	-1.0418	0.0203	-0.0810	-1.5085	-0.9841	1.3387	-1.6740	-0.5206
-0.0173	-0.8872	0.8669	-0.4685	0.3632	-0.7776	0.1736	-1.9148	1.2984	-0.0395
0.0210	-0.3305	-1.0135	1.3785	-0.5195	0.6544	-0.6781	-2.5225	1.5496	1.6190
1.5251	1.7784	-1.3210	-1.0474	-1.3805	0.5327	-0.2775	-1.9361	-0.3827	-2.5551
-0.8639	-0.1558	-0.9651	-0.3959	1.3727	-0.2912	-0.6223	0.5014	0.1767	-0.8848
1.4512	0.0342	1.3759	-0.8693	0.6648	2.2464	-0.0981	-2.2982	-3.4644	0.3032
0.8929	-0.6104	-0.0213	1.3072	-0.4068	0.3534	0.1149	0.4035	0.2236	0.4299
0.9439	0.4123	0.7064	-1.8379	1.0927	1.0744	0.7000	-1.7277	0.9743	-0.1185
-0.4407	0.0027	-1.3186	0.6588	-0.4300	-0.6653	0.2531	0.3033	1.1383	-1.4763
-0.5261	0.0736	-0.4236	-0.3554	0.6179	0.8059	-2.8191	-1.1852	0.4584	-0.4697
1.6223	-0.4407	-0.1455	-0.3721	0.9777	0.4481	2.4642	0.7941	1.2697	0.7929
-1.0937	2.0747	0.2760	-0.0797	0.4867	0.0645	0.0540	-0.0013	-1.4350	-1.6311
1.0815	0.5751	0.4511	-0.6818	-0.4272	-0.2449	0.1520	-2.0115	1.0402	0.4964
-0.8571	1.0325	-0.4960	-0.3344	1.4287	1.7564	-0.6478	0.5689	0.6258	-1.4042
-1.3325	1.9655	0.4885	0.2204	1.6589	0.3397	0.0813	-0.4093	-0.5097	0.2245
0.6125	0.5309	-1.1200	-0.6196	0.9992	0.2867	-1.8785	-2.7040	-0.1593	0.3467
-0.4031	0.8895	1.2982	-0.7668	-0.5642	0.6019	1.0868	-0.6396	-0.7883	-0.4088
-1.0405	1.0831	-1.6011	-0.6186	0.3580	3.1336	0.9119	-0.4379	-0.1611	-0.7847
-1.4334	-0.9944	0.3227	-0.4530	-2.0950	-1.4072	0.0658	0.7489	0.1161	0.0895
-0.2238	-1.1049	-2.3233	-0.7906	0.4702	-1.2707	-0.4538	-0.1645	-0.3622	-0.0197
-0.0145	1.5636	-0.9046	0.7574	0.6387	0.8342	-1.0820	0.6038	1.1391	0.4430
-1.6698	1.7968	1.0951	0.5374	1.5748	0.1806	-0.0780	1.1734	-1.5454	0.1436
-1.3494	-3.1924	0.6353	0.8065	0.2317	-0.8874	0.2633	2.1991	2.5789	-0.0957
-1.5145	0.3816	-0.2498	-1.6298	-0.4692	-0.7686	1.2494	1.0005	1.0994	0.1731
-0.4407	0.5499	0.2986	-0.4888	-1.4369	0.5878	1.9426	-0.6727	-0.4530	-1.8216
1.0965	2.1757	1.7943	0.7257	1.1565	1.6887	-1.3570	0.1746	0.9492	0.3790
0.8626	0.7838	0.6270	-0.2001	-0.3094	-0.0168	-1.8367	0.3456	0.9114	0.7788
-0.2223	-0.4121	1.5780	0.7643	-0.0625	-0.8852	0.8968	-0.8765	0.3992	0.8813
0.6339	1.0458	-0.6239	0.5937	-1.1797	-0.0946	-0.8304	0.5915	0.7505	-0.6396
2.0485	1.0836	0.0677	-0.1577	-0.2153	1.2524	-0.2940	-0.1983	-1.2101	0.2204
-0.5251	-0.6141	-0.0814	-0.9779	-0.3768	1.0803	-0.3459	1.7255	-0.9795	0.6800
1.0719	0.8818	0.2892	-0.7350	-0.0020	0.9433	-0.1126	-0.1291	-0.5824	-0.0493
-1.2256	-0.3515	1.2008	-0.8154	-0.1771	-1.6822	-0.4422	-0.3802	-0.1616	0.5955
1.4737	1.1024	1.4848	-0.3967	-0.7472	0.4157	-0.6995	1.3309	-0.0208	0.4360
-1.3610	0.7330	0.0556	-0.4391	0.9430	-0.6803	-1.9093	1.2726	-0.4838	0.2139
0.3114	0.2006	0.6804	-0.4940	-0.6178	-0.7977	0.4375	0.0582	-0.4587	-0.8616
0.4565	-1.7735	0.2509	1.1451	-0.8522	0.8422	0.9647	-1.6440	0.2054	-1.8575
-1.6318	-0.9291	0.0045	2.2896	-0.5192	-0.7830	-0.7152	-0.6813	1.0036	2.2303
0.1582	0.7956	0.5367	0.8779	1.1810	0.2789	0.2162	-0.1964	0.8600	0.1309
-0.4263	0.9724	1.9531	1.5106	-0.1878	1.2671	0.0771	0.4563	-0.8588	0.8856
0.7870	-0.1128	-0.6626	-0.9939	-0.1232	-0.1524	0.1900	-0.7102	-1.5325	-1.5126
0.6838	-2.5399	0.7851	1.4162	-0.7101	0.7804	-0.2633	0.4942	0.4734	0.1748