

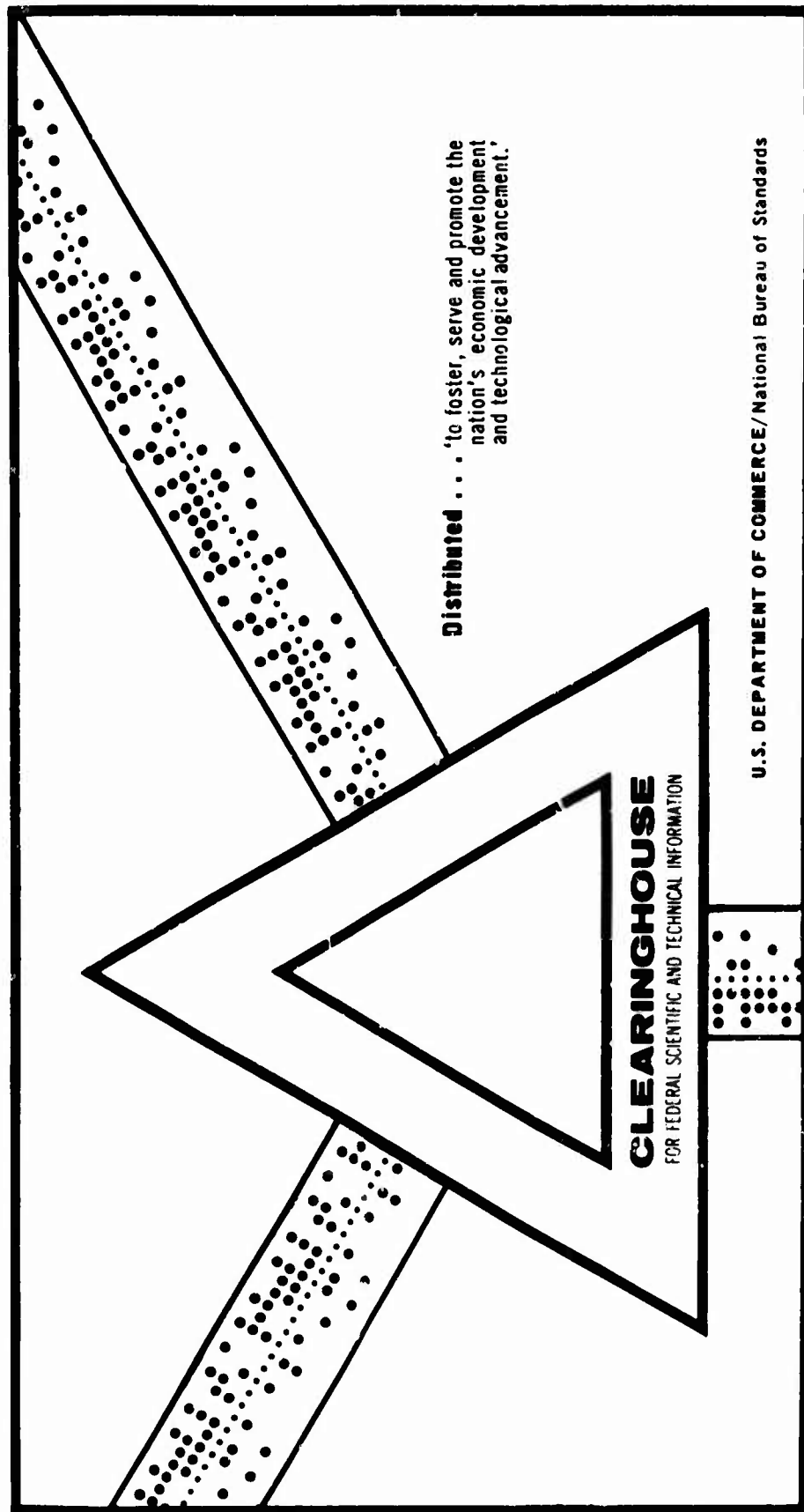
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MINIMUM SAMPLE SIZES FOR COMPARISONS USING CONTINUOUS VARIABLES

Lila E. Massa

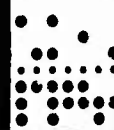
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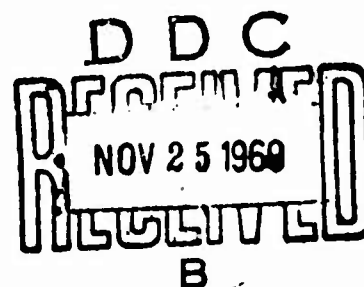
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AD 696966

RDTR NO. 159

8 OCTOBER 1969

MINIMUM SAMPLE SIZES FOR COMPARISONS USING CONTINUOUS VARIABLES



PREPARED BY

RESEARCH AND DEVELOPMENT DEPARTMENT
NAVAL AMMUNITION DEPOT, CRANE, INDIANA

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NAVAL AMMUNITION DEPOT
CRANE, INDIANA

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8 October 1969

MINIMUM SAMPLE SIZES
FOR COMPARISONS USING
CONTINUOUS VARIABLES

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ABSTRACT

When comparing the means from two populations, minimum sample sizes to detect a given difference may be determined. Presented are tables which may be used when unequal as well as equal sample sizes are desired.

INTRODUCTION

Frequently experimenters make comparisons of two population means based on random samples drawn from each of the populations. Too many times, a real and possibly important difference has occurred but the experiment was not sufficiently sensitive to detect the difference. To correct this problem, in the design stage, not only α (the probability of asserting that a difference exists, when actually there is no difference) but also β (the probability of claiming no difference exists when actually the means are different) for a given alternative hypothesis can be determined. The chosen levels can be preserved by taking adequate sample sizes.

An example of this type of problem is the following: Illuminating flares are being manufactured with a load pressure of 10,000 pounds per square inch (psi). It is hypothesized that a load pressure of 20,000 psi will increase the efficiency of the flare. If the efficiency of the flare using the new technique is 4,000 candlepower-seconds/gram greater than the efficiency using the old technique, the experimenter would like to have a high degree of assurance that a significant result will be obtained in the experiment. Due to the cost of the equipment required

to make a change, α is important. β is also important because an increased efficiency is desirable. A decision is made to set $\alpha = .05$ and $\beta = .05$. The question to be asked now is for $\alpha = .05$, what are the minimum sample sizes so that .05 is the probability of accepting the hypothesis of no difference when actually there is a difference of at least 4,000 psi.

Tables are published in several statistics books which give the required sample sizes; however, these sets of tables are only for equal sample sizes. The purpose of this article is to present tables for unequal as well as equal sample sizes.

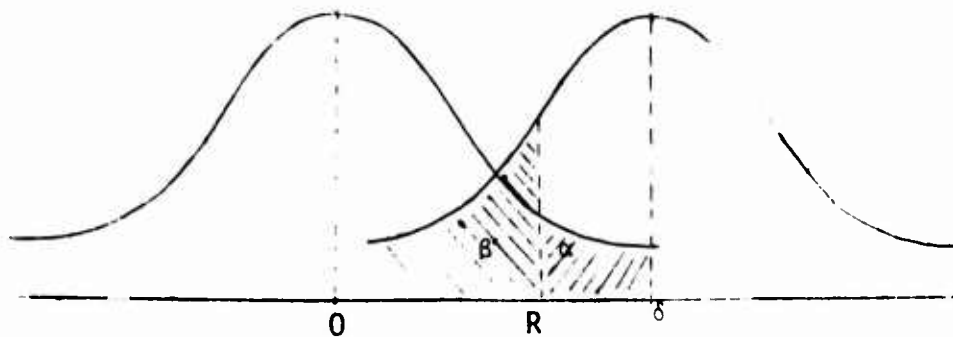
MATHEMATICAL DISCUSSION

The problem of finding the minimum number of observations needed is that of finding n_1 and n_2 so that the distribution of $\bar{x}_1 - \bar{x}_2$, when $\mu_1 - \mu_2 = 0$ and $\mu_1 - \mu_2 = \delta$, will overlap a critical value R by at most α and β respectively. If the two populations are normal and have equal but unknown variances, then the proper statistic to use is the 't' statistic.

$$t_v = \frac{(\bar{x}_1 - \bar{x}_2) - (\mu_1 - \mu_2)}{S_p \sqrt{1/n_1 + 1/n_2}}, \quad v = n_1 + n_2 - 2 \quad (1)$$

$$\text{where } S_p = \sqrt{\frac{(n_1 - 1) S_1^2 + (n_2 - 1) S_2^2}{n_1 + n_2 - 2}}$$

Consider the distribution of $(\bar{x}_1 - \bar{x}_2)$



The curve on the left is under the null hypothesis $\mu_1 - \mu_2 = 0$ while the curve on the right is under the alternative hypothesis $\mu_1 - \mu_2 = \delta$.

Under the null hypothesis,

$$t_{(1-\alpha, v)} = \frac{R-0}{S_p \sqrt{1/n_1 + 1/n_2}} \quad (2)$$

Solve for R in equation (2)

$$R = t_{(1-\alpha, v)} S_p \sqrt{1/n_1 + 1/n_2} \quad (3)$$

Under the alternative hypothesis

$$t_{(\beta, v)} = \frac{R-\delta}{S_p \sqrt{1/n_1 + 1/n_2}} \quad (4)$$

Solve for R - δ in equation (4)

$$R - \delta = t_{(\beta, v)} S_p \sqrt{1/n_1 + 1/n_2} \quad (5)$$

Subtract (5) from (3)

$$\begin{aligned} R - (R-\delta) &= S_p \sqrt{1/n_1 + 1/n_2} t_{(1-\alpha, v)} \\ &\quad - S_p \sqrt{1/n_1 + 1/n_2} t_{(\beta, v)} \end{aligned} \quad (6)$$

By simplification

$$\delta = (t_{(1-\alpha, v)} - t_{(\beta, v)}) S_p \sqrt{1/n_1 + 1/n_2} \quad (7)$$

Divide (7) by S_p and substitute

$$-t_{(\beta, v)} = t_{(1-\beta, v)}$$

$$\frac{\delta}{S_p} = (t_{(1-\alpha, v)} + t_{(1-\beta, v)}) \sqrt{1/n_1 + 1/n_2} \quad (8)$$

Let $D = \delta/S_p$

$$D = (t_{(1-\alpha, v)} + t_{(1-\beta, v)}) \sqrt{1/n_1 + 1/n_2} \quad (9)$$

The computations of the above equation are not difficult; however, it is time-consuming to find minimum values of n_1 and n_2 without a table especially since a trial-and-error procedure is involved. Suppose an experimenter has estimated S_p and has selected values of δ , α , and β . The trial-and-error procedure is as follows:

- (1) Select a good guess for n_1 and n_2 .
- (2) From a "t" - table find $t_{(1-\alpha, v)}$ and $t_{(1-\beta, v)}$.
- (3) Compute this D value (call it D_{Min}).
- (4) Repeat steps 1, 2, 3 until the given $D \geq D_{Min}$ and a decrease in n_1 or n_2 would result in $D < D_{Min}$.

An example of this process follows for a one-tailed test:

Suppose $\delta = 14.5$, $S_p = 10$, $\alpha = .05$, $\beta = .05$.

Then $D = 1.45$

Guess: $n_1 = n_2 = 10$

By substitution into (9)

$$(t_{(.95, 18)} + t_{(.95, 18)}) \sqrt{1/10 + 1/10} = 1.55$$

This result implies that for equal sample sizes $n_1 = n_2 = 10$, the difference it is important to detect will be at least 15.5 for $\alpha = .05$ and $\beta = .05$. To detect a difference of 14.5 for the same α and β , larger sample sizes are needed.

Guess: $n_1 = n_2 = 12$

Calculating D_{Min} , the result is 1.40. Thus a difference of at least 14.0 will be declared for $\alpha = .05$ and $\beta = .05$. This sample size is satisfactory but a check must be made to see if a smaller sample size will do just as well.

Check: $n_1 = n_2 = 11$

For this sample size, $D_{\text{Min}} = 1.47$ which is too large. The correct answer for equal sample sizes is 12.

Tables are much quicker to use than the above process. The tables in the appendix present values of D_{Min} for varying combinations of α and β as well as n_1 and n_2 . Values up to

80 are tabled for n_1 and n_2 . These values were calculated from equation (9) by means of a computer. The resulting values were then rounded off to the second decimal place. With these tables, sample sizes can be determined with a minimum amount of computation and time spent.

PROCEDURE FOR USING TABLES

- (1) Estimate S_p , the standard deviation
- (2) Specify δ , the difference between means that it is important to detect.
- (3) Select α and β .
- (4) Compute D where $D = \delta/S_p$
- (5) In the appropriate table, find n_1 and n_2 as follows:
 - a. for $n_1 = n_2$

Using the diagonal elements for D_{Min} , find the minimum n_1 and n_2 such that the calculated D is greater than or equal to the tabled value of D_{Min} .

- b. for n_1 fixed

If n_1 is fixed, find the minimum n_2 such that the calculated D is greater than or equal to the tabled value of D_{Min} in the column headed by n_1 .

c. for $n_1 \neq n_2$

Various combinations of n_1 and n_2 are presented.

It should be noted that the total of both samples (n_1 and n_2) for a given value of D_{Min} is minimized when $n_1 = n_2$ (due to the discrete nature of n_1 and n_2 , a few minor exceptions exist). The criterion here is to choose the largest tabled value of D which is less than the observed value of D . When costs per unit of n_1 and n_2 are unequal, choose the combination of n_1 and n_2 which satisfy the condition given above and which minimize the cost.

EXAMPLES

(1) ($n_1 = n_2$), one-tailed test

Given: $S_p = 10$, $\delta = 18$, $\alpha = .025$, $\beta = .01$

Find: minimum n_1 and n_2 required to detect a difference of 18

Compute: $D = \delta/S_p = 18/10 = 1.80$

Consult table 11

for $n_1 = n_2 = 12$, $D_{\text{Min}} = 1.87$

for $n_1 = n_2 = 13$, $D_{\text{Min}} = 1.79$

$\therefore$ the required sample sizes are $n_1 = n_2 = 13$

(2) (n_1 fixed), one-tailed test

Given: $S_p = 10$, $\delta = 18$, $\alpha = .025$, $\beta = .01$, $n_1 = 10$

Find: minimum n_2 required to detect a difference of 18

Compute: $D = \delta/S_p = 18/10 = 1.8$

Consult table 11

for $n_1 = 10$ and $n_2 = 17$, $D_{Min} = 1.81$

for $n_1 = 10$ and $n_2 = 18$, $D_{Min} = 1.79$

$\therefore$ the required sample sizes are $n_1 = 10$ and $n_2 = 18$

(3) ($n_1 \neq n_2$, neither fixed), one-tailed test

Given: The cost per unit of n_1 is 5 times the cost of n_2

$S_p = 10$, $\delta = 18$, $\alpha = .025$, $\beta = .01$

Find: n_1 and n_2 such that the total cost ($5n_1 + n_2$) is minimized and a difference of 18 will be detected

Compute: $D = \delta/S_p = 18/10 = 1.8$

Consult table 11 for various values of n_1 . List the smallest value of n_2 which would detect the difference of 18. The combinations and costs are as follows:

n_1	n_2	Cost $\frac{5n_1 + n_2}{2}$
7	45	80
8	28	68
9	21	66
10	18	68
11	16	71
12	14	74
13	13	78
14	12	82

∴ The minimum cost is achieved for $n_1 = 9$ and $n_2 = 21$

OTHER APPLICATIONS

These tables may also be used to determine the minimum accepted difference (δ) for a given S_p , n_1 , n_2 , α and β .

(4) ($n_1 \neq n_2$), one-tailed test

Given: $n_1 = 45$, $n_2 = 22$, $S_p = 10$, $\alpha = .025$, $\beta = .01$

Find: the smallest value of δ for α and β as above.

Consult table 11

$D_{\text{Min}} = 1.14$ (i.e., 1.14 is the smallest D for $n_1 = 45$, $n_2 = 22$ where a difference of δ is detected while $\alpha = .025$, $\beta = .01$)

$$D_{\text{Min}} = \delta/S_p$$

$$1.14 = \delta/10$$

$\therefore \delta = 11.4$ would yield significant results when

$\alpha = .025$ and $\beta = .01$

ACKNOWLEDGEMENTS

The author wishes to thank Jerry Kemp and Ralph Chipman for their assistance and David Kemp for developing the computer program.

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APPENDIX A

TABLE 1

Single-sided test $\alpha = .005$ $\beta = .01$
 Double-sided test $\alpha = .01$

Double-sided test $\alpha = .01$																																							
	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	35	40	45	50	60	70	80			
2	16.89	9.48	7.23	6.19	5.79	5.21	4.94	4.75	4.60	4.48	4.38	4.30	4.23	4.18	4.13	4.09	4.05	4.01	3.98	3.96	3.93	3.91	3.89	3.87	3.86	3.84	3.81	3.80	3.75	3.71	3.69	3.66	3.63	3.61	3.59				
3	9.48	6.82	5.65	5.00	4.79	4.31	4.11	3.96	3.83	3.74	3.65	3.59	3.53	3.48	3.44	3.40	3.37	3.34	3.31	3.29	3.27	3.24	3.23	3.21	3.20	3.18	3.17	3.16	3.15	3.10	3.07	3.04	3.02	2.99	2.96	2.95			
4	7.23	5.65	4.84	4.36	4.04	3.81	3.63	3.50	3.39	3.31	3.23	3.17	3.12	3.08	3.04	3.00	2.97	2.94	2.92	2.90	2.87	2.86	2.84	2.82	2.81	2.80	2.78	2.77	2.72	2.69	2.66	2.64	2.61	2.58	2.57				
5	6.19	5.00	4.36	3.95	3.68	3.47	3.32	3.20	3.10	3.02	2.95	2.90	2.85	2.80	2.77	2.73	2.70	2.68	2.65	2.63	2.61	2.59	2.58	2.56	2.55	2.54	2.53	2.52	2.47	2.43	2.41	2.38	2.35	2.33	2.31				
6	5.79	4.79	4.04	3.68	3.43	3.24	3.10	2.98	2.89	2.82	2.75	2.70	2.65	2.61	2.57	2.54	2.51	2.49	2.46	2.44	2.42	2.40	2.39	2.37	2.36	2.35	2.34	2.33	2.27	2.24	2.22	2.19	2.16	2.14	2.12				
7	5.21	4.31	3.81	3.47	3.24	3.07	2.93	2.82	2.73	2.66	2.60	2.55	2.50	2.46	2.42	2.39	2.36	2.34	2.32	2.29	2.28	2.26	2.24	2.23	2.22	2.21	2.20	2.19	2.13	2.10	2.08	2.06	2.02	1.99	1.98				
8	4.94	4.11	3.63	3.32	3.10	2.93	2.80	2.70	2.61	2.54	2.48	2.43	2.38	2.34	2.31	2.28	2.25	2.22	2.20	2.18	2.16	2.14	2.13	2.12	2.11	2.10	2.09	2.08	2.05	2.01	1.98	1.95	1.93	1.90	1.88				
9	4.75	3.96	3.50	3.20	2.98	2.82	2.70	2.59	2.51	2.44	2.38	2.33	2.29	2.25	2.21	2.18	2.15	2.13	2.10	2.08	2.06	2.05	2.04	2.02	2.01	2.00	1.99	1.97	1.94	1.90	1.88	1.85	1.83	1.81	1.78				
10	4.60	3.83	3.39	3.10	2.89	2.73	2.61	2.51	2.43	2.36	2.30	2.25	2.21	2.17	2.13	2.10	2.07	2.05	2.03	2.00	1.99	1.97	1.96	1.95	1.94	1.93	1.92	1.91	1.90	1.88	1.86	1.84	1.82	1.80	1.76				
11	4.48	3.74	3.31	3.02	2.82	2.66	2.54	2.44	2.36	2.29	2.23	2.18	2.14	2.10	2.06	2.03	2.01	1.98	1.96	1.94	1.92	1.91	1.90	1.89	1.88	1.87	1.86	1.85	1.84	1.82	1.80	1.78	1.76	1.74	1.71				
12	4.38	3.65	3.23	2.95	2.75	2.60	2.48	2.38	2.30	2.23	2.17	2.12	2.08	2.04	2.01	1.98	1.95	1.92	1.90	1.88	1.86	1.84	1.82	1.81	1.80	1.79	1.78	1.77	1.75	1.73	1.71	1.69	1.67	1.65	1.63				
13	4.30	3.59	3.17	2.90	2.70	2.55	2.43	2.33	2.25	2.18	2.12	2.07	2.03	1.99	1.96	1.93	1.90	1.87	1.86	1.84	1.82	1.81	1.80	1.79	1.78	1.77	1.76	1.75	1.73	1.71	1.69	1.67	1.65	1.63	1.61				
14	4.23	3.53	3.12	2.85	2.65	2.50	2.38	2.29	2.21	2.14	2.08	2.03	1.99	1.95	1.92	1.89	1.86	1.84	1.82	1.80	1.78	1.76	1.75	1.74	1.73	1.72	1.71	1.70	1.69	1.67	1.65	1.63	1.61	1.59	1.57				
15	4.18	3.48	3.08	2.80	2.61	2.46	2.34	2.25	2.17	2.10	2.04	1.99	1.95	1.91	1.88	1.84	1.81	1.79	1.77	1.75	1.73	1.71	1.70	1.69	1.68	1.67	1.66	1.65	1.63	1.61	1.59	1.57	1.55	1.53	1.51				
16	4.13	3.44	3.04	2.77	2.57	2.42	2.31	2.21	2.13	2.06	2.01	1.96	1.91	1.88	1.84	1.81	1.79	1.77	1.75	1.73	1.71	1.70	1.69	1.68	1.67	1.66	1.65	1.63	1.61	1.59	1.57	1.55	1.53	1.51	1.49				
17	4.09	3.40	3.00	2.73	2.54	2.39	2.28	2.18	2.10	2.03	1.98	1.93	1.88	1.84	1.81	1.79	1.77	1.75	1.73	1.71	1.70	1.69	1.68	1.67	1.66	1.65	1.64	1.63	1.61	1.59	1.57	1.55	1.53	1.51	1.49				
18	4.05	3.37	2.97	2.70	2.51	2.36	2.25	2.15	2.07	2.01	1.95	1.90	1.86	1.82	1.79	1.76	1.74	1.72	1.70	1.68	1.66	1.64	1.62	1.60	1.58	1.57	1.56	1.55	1.53	1.51	1.49	1.47	1.45	1.43	1.41				
19	4.01	3.34	2.94	2.68	2.49	2.34	2.22	2.13	2.05	1.98	1.92	1.87	1.83	1.80	1.77	1.74	1.72	1.70	1.68	1.66	1.64	1.62	1.60	1.58	1.57	1.56	1.55	1.53	1.51	1.49	1.47	1.45	1.43	1.41	1.39				
20	3.98	3.31	2.92	2.65	2.46	2.32	2.20	2.10	2.03	1.96	1.90	1.86	1.81	1.78	1.75	1.72	1.70	1.68	1.66	1.64	1.62	1.60	1.58	1.57	1.56	1.55	1.53	1.51	1.49	1.47	1.45	1.43	1.41	1.39	1.37				
21	3.96	3.29	2.90	2.63	2.44	2.29	2.18	2.08	2.00	1.94	1.88	1.84	1.80	1.76	1.73	1.70	1.68	1.66	1.64	1.62	1.60	1.58	1.57	1.56	1.55	1.53	1.51	1.49	1.47	1.45	1.43	1.41	1.39	1.37	1.35				
22	3.93	3.27	2.87	2.61	2.42	2.28	2.16	2.06	1.99	1.92	1.87	1.82	1.78	1.73	1.70	1.67	1.65	1.62	1.59	1.57	1.55	1.53	1.52	1.51	1.50	1.49	1.47	1.45	1.43	1.41	1.39	1.37	1.35	1.33	1.31				
23	3.91	3.25	2.86	2.59	2.40	2.26	2.14	2.05	1.97	1.91	1.85	1.81	1.77	1.73	1.70	1.67	1.65	1.62	1.59	1.57	1.55	1.53	1.52	1.51	1.50	1.49	1.47	1.45	1.43	1.41	1.39	1.37	1.35	1.33	1.31				
24	3.89	3.23	2.84	2.58	2.39	2.24	2.13	2.04	1.96	1.90	1.84	1.79	1.74	1.70	1.67	1.65	1.63	1.61	1.59	1.57	1.55	1.53	1.52	1.51	1.50	1.49	1.47	1.45	1.43	1.41	1.39	1.37	1.35	1.33	1.31				
25	3.87	3.21	2.82	2.56	2.37	2.23	2.12	2.02	1.95	1.88	1.83	1.78	1.73	1.69	1.65	1.61	1.58	1.56	1.54	1.52	1.50	1.49	1.47	1.46	1.45	1.43	1.41	1.40	1.38	1.37	1.35	1.33	1.31	1.29	1.27				
26	3.86	3.20	2.81	2.55	2.36	2.22	2.11	2.01	1.94	1.86	1.80	1.75	1.71	1.67	1.63	1.60	1.57	1.55	1.52	1.50	1.49	1.47	1.46	1.45	1.43	1.41	1.40	1.38	1.37	1.35	1.33	1.31	1.29	1.27	1.25				
27	3.84	3.18	2.80	2.54	2.35	2.21	2.10	2.00	1.91	1.85	1.79	1.74	1.70	1.66	1.62	1.59	1.56	1.54	1.51	1.49	1.47	1.46	1.45	1.43	1.41	1.40	1.38	1.37	1.35	1.33	1.31	1.29	1.27	1.25	1.23				
28	3.83	3.17	2.78	2.53	2.34	2.20	2.09	1.98	1.90	1.84	1.78	1.73	1.69	1.65	1.61	1.58	1.55	1.52	1.49	1.47	1.46	1.45	1.43	1.41	1.40	1.38	1.37	1.35	1.33	1.31	1.29	1.27	1.25	1.23	1.21				
29	3.81	3.16	2.78	2.52	2.33	2.19	2.08	1.97	1.90	1.83	1.77	1.71	1.67	1.63	1.60	1.57	1.55	1.53	1.51	1.49	1.47	1.46	1.45	1.43	1.41	1.40	1.38	1.37	1.35	1.33	1.31	1.29	1.27	1.25	1.23				
30	3.80	3.15	2.77	2.52	2.33	2.17	2.05	1.96	1.88	1.82	1.75	1.70	1.66	1.62	1.59	1.56	1.54	1.52	1.50	1.47	1.45	1.43	1.41	1.40	1.38	1.37	1.35	1.33	1.31	1.29	1.27	1.25	1.23	1.21	1.19				
35	3.75	3.10	2.72	2.47	2.28	2.12	2.01	1.92	1.84	1.77	1.71	1.66	1.61	1.57	1.54	1.50	1.47	1.45	1.42	1.40	1.38	1.36	1.34	1.33	1.31	1.29	1.28	1.26	1.24	1.23	1.22	1.21	1.20	1.19	1.01				
40	3.71	3.07	2.69	2.43	2.24	2.09	1.98	1.89	1.80	1.74	1.67	1.62	1.58	1.54	1.50	1.47	1.44	1.41	1.39	1.36	1.34	1.32	1.30	1.29	1.27	1.26	1.24	1.23	1.22	1.21	1.20	1.19	1.06	0.99	0.97				
45	3.69	3.04	2.66	2.41	2.22	2.06	1.95	1.85	1.78	1.71	1.65	1.59	1.55	1.51	1.47	1.44	1.41	1.38	1.36	1.33	1.31																		

Value of $D = \delta/S_p$

TABLE 2

Single-sided test $\alpha = .005$ $\beta = .05$
 Double-sided test $\alpha = .01$

Double-sided test $\alpha = .01$																																				
	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	35	40	45	50	60	70	80
2	12.84	7.48	5.87	5.06	4.61	4.32	4.12	3.97	3.86	3.77	3.69	3.63	3.58	3.54	3.50	3.47	3.44	3.41	3.39	3.37	3.35	3.33	3.32	3.30	3.29	3.28	3.27	3.26	3.25	3.21	3.18	3.16	3.14	3.11	3.09	3.08
3	7.48	5.87	4.61	3.86	3.54	3.32	3.27	3.15	3.09	3.03	2.99	2.96	2.94	2.92	2.90	2.88	2.86	2.84	2.82	2.80	2.78	2.77	2.76	2.75	2.74	2.73	2.72	2.71	2.70	2.66	2.63	2.61	2.59	2.56	2.54	2.53
4	5.87	4.61	3.54	3.03	2.90	2.86	2.79	2.74	2.69	2.65	2.61	2.59	2.57	2.55	2.53	2.50	2.48	2.46	2.44	2.42	2.40	2.39	2.38	2.37	2.36	2.35	2.34	2.33	2.32	2.28	2.26	2.24	2.22	2.20	2.18	2.17
5	5.06	4.32	3.50	3.08	2.96	2.90	2.82	2.76	2.70	2.65	2.61	2.58	2.56	2.54	2.52	2.50	2.48	2.46	2.44	2.42	2.40	2.39	2.38	2.37	2.36	2.35	2.34	2.33	2.32	2.28	2.26	2.24	2.22	2.20	2.18	2.17
6	4.61	3.86	3.03	2.82	2.79	2.73	2.68	2.63	2.59	2.56	2.54	2.52	2.50	2.48	2.46	2.44	2.42	2.40	2.38	2.37	2.36	2.35	2.34	2.33	2.32	2.31	2.30	2.29	2.28	2.24	2.22	2.20	2.18	2.17	2.16	2.15
7	4.32	3.60	3.19	2.92	2.79	2.73	2.68	2.63	2.59	2.56	2.54	2.52	2.50	2.48	2.46	2.44	2.42	2.40	2.38	2.37	2.36	2.35	2.34	2.33	2.32	2.31	2.30	2.29	2.28	2.24	2.22	2.20	2.18	2.17	2.16	2.15
8	4.12	3.44	3.05	2.79	2.61	2.58	2.53	2.49	2.46	2.44	2.42	2.40	2.38	2.37	2.36	2.35	2.34	2.33	2.32	2.31	2.30	2.29	2.28	2.27	2.26	2.25	2.24	2.23	2.22	2.18	2.16	2.14	2.13	2.12	2.11	
9	3.97	3.32	2.95	2.70	2.52	2.45	2.40	2.36	2.33	2.31	2.29	2.27	2.25	2.23	2.21	2.20	2.18	2.16	2.14	2.12	2.10	2.09	2.07	2.05	2.04	2.03	2.02	2.01	2.00	1.96	1.94	1.92	1.90	1.89	1.88	
10	3.86	3.20	2.86	2.62	2.45	2.38	2.33	2.29	2.26	2.24	2.22	2.20	2.18	2.16	2.14	2.12	2.10	2.08	2.06	2.04	2.02	2.00	1.99	1.97	1.96	1.95	1.94	1.93	1.92	1.88	1.86	1.84	1.83	1.82	1.81	
11	3.77	3.15	2.79	2.56	2.39	2.32	2.27	2.23	2.20	2.18	2.16	2.14	2.12	2.10	2.08	2.06	2.04	2.02	2.00	1.98	1.96	1.94	1.93	1.92	1.91	1.90	1.89	1.88	1.87	1.83	1.81	1.79	1.78	1.77	1.76	
12	3.69	3.09	2.76	2.53	2.37	2.30	2.25	2.21	2.18	2.16	2.14	2.12	2.10	2.08	2.06	2.04	2.02	2.00	1.98	1.96	1.94	1.93	1.92	1.91	1.90	1.89	1.88	1.87	1.83	1.81	1.79	1.78	1.77	1.76	1.75	
13	3.63	3.05	2.69	2.46	2.29	2.22	2.17	2.13	2.10	2.08	2.06	2.04	2.02	2.00	1.98	1.96	1.94	1.92	1.90	1.88	1.86	1.84	1.83	1.82	1.81	1.80	1.79	1.78	1.74	1.72	1.70	1.69	1.68	1.67	1.66	
14	3.58	2.99	2.65	2.42	2.25	2.18	2.13	2.09	2.06	2.04	2.02	2.00	1.98	1.96	1.94	1.92	1.90	1.88	1.86	1.84	1.82	1.80	1.79	1.78	1.77	1.76	1.75	1.74	1.70	1.68	1.66	1.64	1.63	1.62	1.61	
15	3.54	2.95	2.61	2.38	2.21	2.14	2.09	2.05	2.02	2.00	1.98	1.96	1.94	1.92	1.90	1.88	1.86	1.84	1.82	1.80	1.78	1.76	1.75	1.74	1.73	1.72	1.71	1.69	1.67	1.65	1.63	1.62	1.61	1.60	1.59	
16	3.50	2.92	2.58	2.35	2.18	2.11	2.06	2.02	1.99	1.97	1.95	1.93	1.91	1.89	1.87	1.85	1.83	1.81	1.79	1.77	1.75	1.73	1.72	1.71	1.70	1.69	1.68	1.66	1.64	1.62	1.60	1.59	1.58	1.57	1.56	
17	3.47	2.89	2.55	2.32	2.15	2.08	2.03	1.99	1.96	1.94	1.92	1.90	1.88	1.86	1.84	1.82	1.80	1.78	1.76	1.74	1.72	1.70	1.69	1.68	1.67	1.66	1.65	1.63	1.61	1.59	1.57	1.55	1.54	1.53	1.52	
18	3.44	2.86	2.52	2.30	2.13	2.06	2.01	1.97	1.94	1.92	1.90	1.88	1.86	1.84	1.82	1.80	1.78	1.76	1.74	1.72	1.70	1.69	1.68	1.67	1.66	1.65	1.63	1.61	1.59	1.57	1.55	1.54	1.53	1.52	1.51	
19	3.41	2.84	2.50	2.28	2.11	2.04	1.99	1.95	1.92	1.90	1.88	1.86	1.84	1.82	1.80	1.78	1.76	1.74	1.72	1.70	1.69	1.68	1.67	1.66	1.65	1.63	1.61	1.59	1.57	1.55	1.54	1.53	1.52	1.51	1.50	
20	3.39	2.82	2.48	2.26	2.10	2.03	1.98	1.94	1.91	1.89	1.87	1.85	1.83	1.81	1.79	1.77	1.75	1.73	1.71	1.69	1.67	1.65	1.63	1.62	1.61	1.60	1.58	1.56	1.54	1.52	1.51	1.50	1.49	1.48	1.47	
21	3.37	2.80	2.47	2.24	2.08	2.01	1.96	1.92	1.89	1.87	1.85	1.83	1.81	1.79	1.77	1.75	1.73	1.71	1.69	1.67	1.65	1.63	1.62	1.61	1.60	1.58	1.56	1.54	1.52	1.51	1.50	1.49	1.48	1.47	1.46	
22	3.35	2.78	2.45	2.23	2.07	1.99	1.94	1.90	1.87	1.85	1.83	1.81	1.79	1.77	1.75	1.73	1.71	1.69	1.67	1.65	1.63	1.62	1.61	1.60	1.58	1.56	1.54	1.52	1.51	1.50	1.49	1.48	1.47	1.46	1.45	
23	3.33	2.77	2.44	2.21	2.05	1.97	1.92	1.88	1.85	1.83	1.81	1.79	1.77	1.75	1.73	1.71	1.69	1.67	1.65	1.63	1.62	1.61	1.60	1.58	1.56	1.54	1.52	1.51	1.50	1.49	1.48	1.47	1.46	1.45	1.44	
24	3.32	2.75	2.43	2.20	2.04	1.96	1.91	1.87	1.84	1.82	1.80	1.78	1.76	1.74	1.72	1.70	1.68	1.66	1.64	1.62	1.61	1.60	1.58	1.56	1.54	1.52	1.51	1.50	1.49	1.48	1.47	1.46	1.45	1.44	1.43	
25	3.30	2.74	2.41	2.19	2.03	1.95	1.90	1.86	1.83	1.81	1.79	1.77	1.75	1.73	1.71	1.69	1.67	1.65	1.63	1.62	1.61	1.60	1.58	1.56	1.54	1.52	1.51	1.50	1.49	1.48	1.47	1.46	1.45	1.44	1.43	
26	3.29	2.73	2.40	2.18	2.02	1.94	1.89	1.85	1.82	1.80	1.78	1.76	1.74	1.72	1.70	1.68	1.66	1.64	1.62	1.61	1.60	1.58	1.56	1.54	1.52	1.51	1.50	1.49	1.48	1.47	1.46	1.45	1.44	1.43	1.42	
27	3.28	2.72	2.39	2.17	2.01	1.93	1.88	1.84	1.81	1.79	1.77	1.75	1.73	1.71	1.69	1.67	1.65	1.63	1.62	1.61	1.60	1.58	1.56	1.54	1.52	1.51	1.50	1.49	1.48	1.47	1.46	1.45	1.44	1.43	1.42	
28	3.27	2.71	2.38	2.16	2.00	1.92	1.87	1.83	1.80	1.78	1.76	1.74	1.72	1.70	1.68	1.66	1.64	1.62	1.61	1.60	1.58	1.56	1.54	1.52	1.51	1.50	1.49	1.48	1.47	1.46	1.45	1.44	1.43	1.42	1.41	
29	3.26	2.70	2.37	2.15	1.99	1.91	1.86	1.82	1.79	1.77	1.75	1.73	1.71	1.69	1.67	1.65	1.63	1.62	1.61	1.60	1.58	1.56	1.54	1.52	1.51	1.50	1.49	1.48	1.47	1.46	1.45	1.44	1.43	1.42	1.41	
30	3.25	2.69	2.37	2.15	1.99	1.91	1.86	1.82	1.79	1.77	1.75	1.73	1.71	1.69	1.67	1.65	1.63	1.62	1.61	1.60	1.58	1.56	1.54	1.52	1.51	1.50	1.49	1.48	1.47	1.46	1.45	1.44	1.43	1.42	1.41	
35	3.21	2.66	2.33	2.11	1.95	1.87	1.82	1.78	1.75	1.73	1.71	1.69	1.67	1.65	1.63	1.62	1.61	1.60	1.58	1.56	1.54	1.52	1.51	1.50	1.49	1.48	1.47	1.46	1.45	1.44	1.43	1.42	1.41	1.40	1.39	
40	3.18	2.63	2.30	2.08	1.92	1.84	1.79	1.75	1.72	1.70	1.68	1.66	1.64	1.62	1.60	1.58	1.56	1.54	1.52	1.51	1.50	1.49	1.48	1.47	1.46	1.45	1.44	1.43	1.42	1.41	1.40	1.39	1.38	1.37	1.36	
45	3.16	2.61	2.28	2.06	1.90	1.82	1.77	1.73	1.70	1.68	1.66	1.64	1.62																							

Value of $D = \delta/S_p$

NOT REPRODUCIBLE

TABLE 3

Single-sided test $\alpha = .005$ $\beta = .10$

Double-sided test $\alpha = .01$

Double-sided test $\alpha = .01$																																						
	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	35	40	45	50	60	70	80		
1	11.81	6.93	5.38	4.64	4.20	3.96	3.76	3.62	3.52	3.44	3.37	3.31	3.27	3.23	3.19	3.16	3.14	3.11	3.09	3.07	3.06	3.06	3.04	3.02	3.00	2.99	2.99	2.99	2.97	2.95	2.90	2.84	2.77	2.64	2.49	2.31		
2	6.85	4.04	4.02	3.76	3.67	3.58	3.54	3.50	3.46	3.43	3.40	3.37	3.35	3.33	3.31	3.29	3.27	3.26	3.24	3.23	3.22	3.21	3.20	3.19	3.18	3.17	3.16	3.15	3.14	3.12	3.10	3.08	3.06	3.04	3.02	2.99		
3	5.31	4.71	4.64	4.50	4.40	4.32	4.26	4.21	4.16	4.12	4.08	4.05	4.02	4.00	3.97	3.95	3.93	3.91	3.89	3.87	3.86	3.84	3.83	3.81	3.80	3.79	3.78	3.77	3.76	3.74	3.72	3.70	3.68	3.66	3.64	3.61		
4	4.64	4.36	4.30	4.24	4.18	4.12	4.07	4.02	3.97	3.93	3.89	3.86	3.83	3.81	3.79	3.77	3.75	3.73	3.71	3.70	3.68	3.67	3.65	3.64	3.62	3.61	3.60	3.59	3.58	3.56	3.54	3.52	3.50	3.48	3.46	3.44	3.41	
5	4.26	4.06	4.00	3.94	3.88	3.82	3.77	3.72	3.67	3.63	3.59	3.56	3.53	3.51	3.49	3.47	3.45	3.43	3.41	3.40	3.38	3.37	3.35	3.34	3.32	3.31	3.30	3.29	3.28	3.26	3.24	3.22	3.20	3.18	3.16	3.14	3.11	
6	4.00	3.77	3.70	3.64	3.58	3.52	3.47	3.42	3.37	3.33	3.29	3.26	3.23	3.21	3.19	3.17	3.15	3.13	3.11	3.10	3.08	3.07	3.05	3.04	3.02	3.01	3.00	2.99	2.98	2.96	2.94	2.92	2.90	2.88	2.86	2.84	2.81	
7	3.76	3.51	3.44	3.38	3.32	3.26	3.21	3.16	3.11	3.07	3.03	3.00	2.97	2.95	2.93	2.91	2.89	2.87	2.85	2.83	2.82	2.80	2.79	2.77	2.76	2.74	2.73	2.72	2.71	2.69	2.67	2.65	2.63	2.61	2.59	2.56	2.54	
8	3.54	3.28	3.21	3.15	3.09	3.03	2.97	2.92	2.87	2.82	2.78	2.74	2.71	2.69	2.67	2.65	2.63	2.61	2.59	2.57	2.56	2.54	2.53	2.51	2.50	2.48	2.47	2.46	2.44	2.42	2.40	2.38	2.36	2.34	2.32	2.30	2.27	2.25
9	3.34	3.07	3.00	2.94	2.88	2.82	2.76	2.70	2.65	2.60	2.56	2.52	2.49	2.47	2.45	2.43	2.41	2.39	2.37	2.35	2.34	2.32	2.31	2.29	2.28	2.26	2.25	2.23	2.22	2.20	2.18	2.16	2.14	2.12	2.10	2.08	2.05	2.03
10	3.16	2.89	2.82	2.76	2.70	2.64	2.58	2.52	2.46	2.40	2.35	2.31	2.28	2.26	2.24	2.22	2.20	2.18	2.16	2.14	2.13	2.11	2.10	2.08	2.07	2.05	2.04	2.02	2.01	1.99	1.97	1.95	1.93	1.91	1.89	1.86	1.84	
11	2.99	2.72	2.65	2.59	2.53	2.47	2.41	2.35	2.29	2.23	2.18	2.14	2.11	2.09	2.07	2.05	2.03	2.01	1.99	1.97	1.95	1.94	1.92	1.91	1.89	1.88	1.86	1.85	1.83	1.81	1.79	1.77	1.75	1.73	1.71	1.69	1.66	1.64
12	2.81	2.54	2.47	2.41	2.35	2.29	2.23	2.17	2.11	2.05	2.00	1.96	1.93	1.91	1.89	1.87	1.85	1.83	1.81	1.79	1.77	1.75	1.74	1.72	1.71	1.69	1.68	1.66	1.64	1.62	1.60	1.58	1.56	1.54	1.52	1.50	1.47	1.45
13	2.64	2.37	2.30	2.24	2.18	2.12	2.06	2.00	1.94	1.88	1.83	1.79	1.76	1.74	1.72	1.70	1.68	1.66	1.64	1.62	1.60	1.58	1.57	1.55	1.54	1.52	1.51	1.49	1.47	1.45	1.43	1.41	1.39	1.37	1.35	1.33	1.31	
14	2.46	2.19	2.12	2.06	2.00	1.94	1.88	1.82	1.76	1.70	1.65	1.61	1.58	1.56	1.54	1.52	1.50	1.48	1.46	1.44	1.42	1.41	1.39	1.38	1.36	1.35	1.33	1.31	1.29	1.27	1.25	1.23	1.21	1.19	1.17	1.15	1.13	
15	2.29	2.02	1.95	1.89	1.83	1.77	1.71	1.65	1.59	1.53	1.48	1.44	1.41	1.39	1.37	1.35	1.33	1.31	1.29	1.27	1.25	1.24	1.22	1.21	1.19	1.18	1.16	1.14	1.12	1.10	1.08	1.06	1.04	1.02	1.00	0.98	0.96	
16	2.11	1.84	1.77	1.71	1.65	1.59	1.53	1.47	1.41	1.35	1.30	1.26	1.23	1.21	1.19	1.17	1.15	1.13	1.11	1.09	1.07	1.06	1.04	1.03	1.01	1.00	0.98	0.96	0.94	0.92	0.90	0.88	0.86	0.84	0.82	0.80	0.78	
17	1.94	1.67	1.60	1.54	1.48	1.42	1.36	1.30	1.24	1.18	1.13	1.09	1.06	1.04	1.02	1.00	0.98	0.96	0.94	0.92	0.90	0.89	0.87	0.86	0.84	0.83	0.81	0.79	0.77	0.75	0.73	0.71	0.69	0.67	0.65	0.63		
18	1.76	1.49	1.42	1.36	1.30	1.24	1.18	1.12	1.06	1.00	0.95	0.91	0.88	0.86	0.84	0.82	0.80	0.78	0.76	0.74	0.72	0.71	0.69	0.68	0.66	0.64	0.62	0.60	0.58	0.56	0.54	0.52	0.50	0.48	0.46	0.44		
19	1.59	1.32	1.25	1.19	1.13	1.07	1.01	0.95	0.89	0.83	0.78	0.74	0.71	0.69	0.67	0.65	0.63	0.61	0.59	0.57	0.55	0.54	0.52	0.51	0.49	0.47	0.45	0.43	0.41	0.39	0.37	0.35	0.33	0.31	0.29	0.27		
20	1.41	1.14	1.07	1.01	0.95	0.89	0.83	0.77	0.71	0.65	0.60	0.56	0.53	0.51	0.49	0.47	0.45	0.43	0.41	0.39	0.37	0.36	0.34	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19	0.17	0.15	0.13	0.11	0.09		
21	1.24	0.97	0.90	0.84	0.78	0.72	0.66	0.60	0.54	0.48	0.43	0.39	0.36	0.34	0.32	0.30	0.28	0.26	0.24	0.22	0.21	0.19	0.18	0.16	0.15	0.13	0.11	0.09	0.07	0.05	0.03	0.01	0.00	0.00	0.00	0.00		
22	1.06	0.79	0.72	0.66	0.60	0.54	0.48	0.42	0.36	0.30	0.25	0.21	0.18	0.16	0.14	0.12	0.10	0.08	0.06	0.04	0.03	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
23	0.89	0.62	0.55	0.49	0.43	0.37	0.31	0.25	0.19	0.13	0.08	0.04	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
24	0.71	0.44	0.37	0.31	0.25	0.19	0.13	0.07	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
25	0.54	0.27	0.20	0.14	0.08	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
26	0.36	0.09	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
27	0.19	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
28	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
31	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00													

TABLE 4

Single-sided test $\alpha = .005$ $\beta = .20$
 Double-sided test $\alpha = .01$

	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	35	40	45	50	60	70	80
2	10.99	6.22	4.80	4.14	3.77	3.52	3.36	3.23	3.14	3.06	3.00	2.95	2.91	2.87	2.84	2.81	2.79	2.77	2.75	2.73	2.70	2.69	2.68	2.67	2.66	2.65	2.64	2.63	2.60	2.58	2.56	2.54	2.52	2.51	2.49	
3	6.22	4.53	3.78	3.37	3.11	2.93	2.80	2.70	2.62	2.56	2.51	2.46	2.43	2.39	2.37	2.34	2.32	2.30	2.28	2.27	2.26	2.24	2.23	2.22	2.21	2.20	2.19	2.18	2.15	2.13	2.11	2.10	2.08	2.06	2.05	
4	4.80	3.78	3.26	2.95	2.74	2.59	2.48	2.39	2.32	2.27	2.22	2.18	2.15	2.12	2.09	2.07	2.05	2.03	2.01	2.00	1.99	1.97	1.96	1.95	1.94	1.93	1.92	1.90	1.86	1.85	1.83	1.81	1.80	1.79		
5	4.14	3.37	2.95	2.68	2.50	2.37	2.27	2.19	2.13	2.07	2.03	1.99	1.96	1.93	1.91	1.88	1.87	1.85	1.83	1.82	1.80	1.79	1.78	1.77	1.76	1.75	1.74	1.71	1.69	1.67	1.65	1.63	1.62	1.61		
6	3.77	3.11	2.74	2.50	2.34	2.22	2.12	2.05	1.99	1.94	1.90	1.86	1.82	1.80	1.77	1.75	1.73	1.72	1.70	1.69	1.67	1.66	1.65	1.64	1.63	1.62	1.60	1.58	1.56	1.54	1.52	1.50	1.49	1.48		
7	3.52	2.93	2.59	2.37	2.22	2.10	2.01	1.94	1.88	1.83	1.79	1.75	1.72	1.69	1.67	1.65	1.63	1.62	1.60	1.59	1.57	1.56	1.55	1.54	1.53	1.52	1.50	1.47	1.45	1.43	1.42	1.40	1.39	1.37		
8	3.36	2.80	2.48	2.27	2.12	2.01	1.92	1.85	1.80	1.75	1.71	1.67	1.64	1.62	1.59	1.57	1.55	1.54	1.52	1.51	1.49	1.48	1.47	1.46	1.45	1.44	1.43	1.40	1.37	1.35	1.34	1.32	1.30	1.29		
9	3.23	2.70	2.39	2.19	2.04	1.94	1.85	1.78	1.72	1.66	1.61	1.56	1.52	1.49	1.47	1.45	1.43	1.42	1.40	1.39	1.37	1.36	1.35	1.34	1.33	1.32	1.30	1.27	1.24	1.23	1.21	1.19	1.17	1.15	1.13	
10	3.14	2.62	2.32	2.13	1.99	1.88	1.80	1.73	1.67	1.61	1.55	1.50	1.45	1.41	1.38	1.36	1.34	1.33	1.31	1.30	1.28	1.27	1.26	1.25	1.24	1.23	1.20	1.17	1.14	1.13	1.11	1.09	1.07	1.05	1.04	
11	3.06	2.56	2.27	2.07	1.94	1.83	1.75	1.68	1.62	1.56	1.50	1.45	1.40	1.35	1.31	1.28	1.26	1.25	1.23	1.22	1.20	1.19	1.18	1.17	1.16	1.15	1.12	1.09	1.06	1.05	1.03	1.01	0.99	0.98	0.96	
12	3.00	2.51	2.22	2.02	1.89	1.79	1.71	1.64	1.58	1.52	1.46	1.41	1.36	1.31	1.27	1.24	1.22	1.21	1.19	1.18	1.16	1.15	1.14	1.13	1.12	1.11	1.08	1.05	1.02	1.01	0.99	0.97	0.95	0.94	0.92	
13	2.95	2.46	2.18	1.98	1.86	1.75	1.67	1.61	1.55	1.50	1.44	1.39	1.34	1.29	1.25	1.22	1.20	1.19	1.17	1.16	1.15	1.14	1.13	1.12	1.11	1.08	1.05	1.02	1.00	0.98	0.96	0.94	0.93	0.91	0.89	
14	2.91	2.43	2.15	1.96	1.84	1.72	1.64	1.58	1.52	1.46	1.41	1.36	1.31	1.26	1.22	1.19	1.17	1.16	1.15	1.14	1.13	1.12	1.11	1.10	1.09	1.07	1.04	1.01	0.99	0.97	0.95	0.93	0.91	0.89	0.88	
15	2.87	2.39	2.12	1.93	1.80	1.70	1.62	1.55	1.50	1.44	1.39	1.34	1.29	1.24	1.19	1.15	1.13	1.12	1.10	1.09	1.07	1.06	1.05	1.04	1.03	1.02	0.99	0.96	0.94	0.92	0.90	0.88	0.85	0.84	0.82	
16	2.84	2.37	2.09	1.91	1.77	1.67	1.59	1.53	1.47	1.41	1.36	1.31	1.26	1.21	1.17	1.14	1.12	1.11	1.09	1.07	1.06	1.05	1.04	1.03	1.02	1.00	0.97	0.94	0.92	0.90	0.88	0.85	0.84	0.82	0.81	
17	2.81	2.34	2.07	1.88	1.75	1.65	1.57	1.51	1.45	1.40	1.34	1.29	1.24	1.19	1.15	1.12	1.10	1.09	1.07	1.06	1.05	1.04	1.03	1.02	1.01	0.99	0.96	0.94	0.92	0.90	0.88	0.85	0.84	0.82	0.81	
18	2.79	2.32	2.05	1.87	1.73	1.63	1.55	1.49	1.43	1.38	1.33	1.28	1.23	1.18	1.14	1.11	1.10	1.08	1.07	1.06	1.05	1.04	1.03	1.02	1.01	0.99	0.96	0.94	0.92	0.90	0.88	0.85	0.84	0.82	0.81	
19	2.77	2.30	2.03	1.85	1.70	1.60	1.52	1.46	1.40	1.35	1.30	1.25	1.20	1.15	1.11	1.08	1.07	1.06	1.05	1.04	1.03	1.02	1.01	1.00	0.99	0.97	0.94	0.92	0.90	0.88	0.85	0.84	0.82	0.81	0.79	
20	2.75	2.28	2.01	1.83	1.68	1.58	1.50	1.44	1.38	1.33	1.28	1.23	1.18	1.14	1.10	1.07	1.06	1.05	1.04	1.03	1.02	1.01	1.00	0.99	0.98	0.96	0.94	0.92	0.90	0.88	0.85	0.84	0.82	0.81	0.79	0.78
21	2.73	2.27	2.00	1.82	1.66	1.56	1.48	1.42	1.36	1.31	1.26	1.21	1.16	1.12	1.08	1.05	1.04	1.03	1.02	1.01	1.00	0.99	0.98	0.97	0.96	0.94	0.92	0.90	0.88	0.85	0.84	0.82	0.81	0.79	0.78	
22	2.72	2.26	1.99	1.81	1.65	1.55	1.47	1.41	1.35	1.30	1.25	1.20	1.15	1.11	1.07	1.04	1.03	1.02	1.01	1.00	0.99	0.98	0.97	0.96	0.95	0.93	0.91	0.89	0.87	0.85	0.83	0.81	0.79	0.78	0.77	
23	2.70	2.24	1.97	1.79	1.63	1.53	1.45	1.39	1.33	1.28	1.23	1.18	1.13	1.09	1.05	1.02	1.01	1.00	0.99	0.98	0.97	0.96	0.95	0.94	0.93	0.91	0.89	0.87	0.85	0.83	0.81	0.79	0.78	0.77	0.76	
24	2.69	2.23	1.96	1.78	1.62	1.52	1.44	1.38	1.32	1.27	1.22	1.17	1.12	1.08	1.04	1.01	1.00	0.99	0.98	0.97	0.96	0.95	0.94	0.93	0.92	0.90	0.88	0.86	0.84	0.82	0.80	0.78	0.77	0.76	0.75	
25	2.68	2.22	1.95	1.77	1.61	1.51	1.43	1.37	1.31	1.26	1.21	1.16	1.11	1.07	1.03	1.00	0.99	0.98	0.97	0.96	0.95	0.94	0.93	0.92	0.91	0.89	0.87	0.85	0.83	0.81	0.79	0.78	0.77	0.76	0.75	
26	2.67	2.21	1.94	1.76	1.60	1.50	1.42	1.36	1.30	1.25	1.20	1.15	1.10	1.06	1.02	1.00	0.99	0.98	0.97	0.96	0.95	0.94	0.93	0.92	0.91	0.89	0.87	0.85	0.83	0.81	0.79	0.78	0.77	0.76	0.75	
27	2.66	2.20	1.93	1.75	1.59	1.49	1.41	1.35	1.29	1.24	1.19	1.14	1.09	1.05	1.01	1.00	0.99	0.98	0.97	0.96	0.95	0.94	0.93	0.92	0.91	0.89	0.87	0.85	0.83	0.81	0.79	0.78	0.77	0.76	0.75	
28	2.65	2.19	1.92	1.74	1.58	1.48	1.40	1.34	1.28	1.23	1.18	1.13	1.08	1.04	1.00	0.99	0.98	0.97	0.96	0.95	0.94	0.93	0.92	0.91	0.90	0.88	0.86	0.84	0.82	0.80	0.78	0.77	0.76	0.75	0.74	
29	2.64	2.18	1.91	1.73	1.57	1.47	1.39	1.33	1.27	1.22	1.17	1.12	1.07	1.03	0.99	0.98	0.97	0.96	0.95	0.94	0.93	0.92	0.91	0.90	0.89	0.87	0.85	0.83	0.81	0.79	0.78	0.77	0.76	0.75	0.74	
30	2.63	2.17	1.90	1.72	1.56	1.46	1.38	1.32	1.26	1.21	1.16	1.11	1.06	1.02	0.98	0.97	0.96	0.95	0.94	0.93	0.92	0.91	0.90	0.89	0.88	0.86	0.84	0.82	0.80	0.78	0.77	0.76	0.75	0.74	0.73	
31	2.62	2.16	1.89	1.71	1.55	1.45	1.37	1.31	1.25	1.20	1.15	1.10	1.05	1.01	0.97	0.96	0.95	0.94	0.93	0.92	0.91	0.90	0.89	0.88	0.87	0.85	0.83	0.81	0.79	0.78	0.77	0.76	0.75	0.74	0.73	
32	2.61	2.15	1.88	1.70	1.54	1.44	1.36	1.30	1.24	1.19	1.14	1.09	1.04	1.00	0.96	0.95	0.94	0.93	0.92	0.91	0.90	0.89	0.88	0.87	0.86	0.84	0.82	0.80	0.78	0.77	0.76	0.75	0.74	0.73	0.72	
33	2.60	2.14	1.87	1.69	1.53	1.43	1.35	1.29	1.23	1.18	1.13	1.08	1.03	0.99	0.95	0.94	0.93	0.92	0.91	0.90	0.89	0.88	0.87	0.86	0.85	0.83	0.81	0.79	0.78	0.77	0.76	0.75	0.74	0.73	0.72	
34	2.59	2.13	1.86	1.68	1.52	1.42	1.34	1.28	1.22	1.17	1.12	1.07	1.02	0.98	0.94	0.93	0.92	0.91	0.90	0.89	0.88	0.87	0.86	0.85	0.84	0.82	0.80	0.78	0.77	0.76	0.75	0.74	0.73	0.72	0.71	
35	2.58	2.12	1.85	1.67	1.51	1.41	1.33	1.27	1.21	1.16	1.11	1.06	1.01	0.97	0.93	0.92	0.91	0.90	0.89	0.88	0.87	0.86	0.85	0.84	0.83	0.81	0.79	0.78	0.77	0.76	0.75	0.74	0.73	0.72	0.71	
36	2.57	2.11	1.84	1.66	1.50	1.40	1.32	1.26	1.20	1.15	1.10	1.05	1.00	0.96	0.92	0.91	0.90	0.89	0.88	0.87	0.86	0.85	0.84	0.83	0.82	0.80	0.78	0.77	0.76	0.75	0.74	0.73	0.72	0.71	0.70	
37	2.56	2.10	1.83	1.65	1.49	1.39	1.31	1.25	1.19	1.14	1.09	1.04	0.99	0.95	0.91	0.90	0.89	0.88	0.87	0.86	0.85	0.84	0.83	0.82	0.81	0.79	0.78	0.77	0.76	0.75	0.74	0.73	0.72	0.71	0.70	
38	2.55	2.09	1.82	1.64	1.48	1.38	1.30	1.24	1.18	1.13	1.08	1.03	0.98	0.94	0.90	0.89	0.88	0.87	0.86	0.85	0.84	0.83	0.82	0.8												

Single-sided test $\alpha = .005$ $\beta = .50$
Double-sided test $\alpha = .01$

Double-sided test $\alpha = .01$																																				
	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	35	40	45	50	60	70	80
2	9.80	5.33	3.89	1.77	3.05	2.83	2.65	2.54	2.45	2.39	2.33	2.29	2.25	2.22	2.19	2.17	2.15	2.13	2.11	2.09	2.08	2.07	2.06	2.05	2.04	2.03	2.02	2.01	1.98	1.96	1.94	1.93	1.91	1.90	1.89	
3	9.11	1.76	3.08	2.71	2.47	2.32	2.20	2.11	2.04	1.99	1.94	1.91	1.87	1.85	1.82	1.80	1.78	1.77	1.75	1.73	1.72	1.71	1.70	1.69	1.68	1.67	1.67	1.66	1.64	1.62	1.60	1.59	1.57	1.56	1.55	
4	1.99	2.70	2.82	2.35	2.17	2.04	1.94	1.87	1.81	1.76	1.72	1.69	1.66	1.63	1.61	1.59	1.57	1.56	1.54	1.53	1.52	1.51	1.50	1.49	1.48	1.47	1.47	1.46	1.44	1.42	1.40	1.39	1.37	1.36	1.35	
5	1.37	2.71	2.35	2.12	1.97	1.87	1.79	1.73	1.67	1.63	1.59	1.54	1.51	1.49	1.47	1.45	1.43	1.42	1.40	1.39	1.38	1.37	1.36	1.35	1.34	1.33	1.33	1.32	1.30	1.28	1.27	1.26	1.24	1.23	1.22	
6	1.05	2.47	2.13	1.97	1.81	1.71	1.65	1.59	1.54	1.50	1.46	1.43	1.40	1.38	1.36	1.34	1.33	1.31	1.30	1.29	1.28	1.27	1.26	1.25	1.24	1.23	1.23	1.22	1.20	1.18	1.17	1.16	1.14	1.13	1.12	
7	0.78	2.19	1.85	1.69	1.53	1.43	1.37	1.31	1.26	1.22	1.18	1.15	1.13	1.11	1.09	1.08	1.06	1.05	1.03	1.02	1.01	1.00	0.99	0.98	0.97	0.96	0.95	0.94	0.92	0.90	0.88	0.87	0.86	0.84	0.83	0.82
8	0.66	2.00	1.66	1.50	1.34	1.24	1.18	1.12	1.07	1.03	0.99	0.96	0.93	0.91	0.89	0.88	0.86	0.85	0.83	0.82	0.81	0.80	0.79	0.78	0.77	0.76	0.75	0.74	0.72	0.70	0.69	0.67	0.66	0.64	0.63	0.62
9	0.56	1.89	1.55	1.39	1.23	1.13	1.07	1.01	0.96	0.92	0.88	0.85	0.82	0.80	0.78	0.77	0.75	0.74	0.72	0.71	0.70	0.69	0.68	0.67	0.66	0.65	0.64	0.62	0.60	0.59	0.57	0.56	0.54	0.53	0.52	0.51
10	0.46	1.70	1.36	1.20	1.04	0.94	0.88	0.82	0.77	0.73	0.69	0.66	0.63	0.61	0.59	0.58	0.56	0.55	0.53	0.52	0.51	0.50	0.49	0.48	0.47	0.46	0.44	0.42	0.41	0.39	0.38	0.36	0.35	0.34	0.33	0.32
11	0.36	1.51	1.17	1.01	0.85	0.75	0.69	0.63	0.58	0.54	0.50	0.47	0.44	0.42	0.40	0.39	0.37	0.36	0.34	0.33	0.32	0.31	0.30	0.29	0.28	0.27	0.25	0.24	0.22	0.21	0.19	0.18	0.16	0.15	0.14	0.13
12	0.26	1.32	0.98	0.82	0.66	0.56	0.50	0.44	0.39	0.35	0.31	0.28	0.25	0.23	0.21	0.20	0.18	0.17	0.15	0.14	0.13	0.12	0.11	0.10	0.09	0.08	0.06	0.05	0.03	0.02	0.01	0.00	0.00	0.00	0.00	0.00
13	0.16	1.13	0.79	0.63	0.47	0.37	0.31	0.25	0.20	0.16	0.12	0.09	0.06	0.04	0.03	0.01	0.00	0.00	0.00	0.																

Value of $D = \delta/S_D$

T A B L E 6

Single-sided test $\alpha = .01$ $\beta = .01$

Double-sided test $\alpha = .02$

N_1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	35	40	45	50	60	70	80	
2	13.93	6.29	6.49	5.63	5.13	4.81	4.58	4.41	4.28	4.18	4.10	4.03	3.97	3.92	3.87	3.84	3.80	3.77	3.75	3.73	3.70	3.69	3.67	3.65	3.64	3.62	3.61	3.60	3.59	3.54	3.51	3.49	3.47	3.44	3.42	3.40	
3	8.29	6.12	5.14	4.59	4.24	4.00	3.82	3.69	3.58	3.49	3.42	3.36	3.31	3.27	3.23	3.20	3.17	3.14	3.12	3.10	3.08	3.06	3.04	3.03	3.02	3.00	2.99	2.98	2.96	2.93	2.90	2.88	2.86	2.83	2.81	2.79	
4	6.49	5.14	4.44	4.02	3.74	3.54	3.39	3.27	3.17	3.09	3.03	2.98	2.93	2.89	2.85	2.82	2.79	2.77	2.75	2.73	2.71	2.69	2.68	2.66	2.65	2.64	2.63	2.62	2.62	2.57	2.54	2.52	2.50	2.47	2.45	2.43	
5	5.63	4.59	4.02	3.66	3.42	3.24	3.10	2.99	2.90	2.83	2.77	2.72	2.67	2.64	2.60	2.57	2.55	2.52	2.50	2.48	2.46	2.45	2.43	2.42	2.40	2.39	2.39	2.38	2.37	2.33	2.30	2.27	2.25	2.22	2.20	2.19	
6	5.13	4.24	3.74	3.42	3.19	3.02	2.87	2.74	2.64	2.56	2.50	2.44	2.39	2.35	2.31	2.28	2.25	2.23	2.20	2.18	2.16	2.15	2.13	2.12	2.10	2.09	2.08	2.07	2.05	2.01	1.98	1.95	1.93	1.91	1.89	1.87	
7	4.81	4.00	3.54	3.24	3.02	2.87	2.74	2.64	2.56	2.50	2.44	2.39	2.35	2.31	2.28	2.25	2.23	2.20	2.18	2.16	2.15	2.13	2.12	2.10	2.09	2.08	2.07	2.05	2.01	1.98	1.95	1.93	1.91	1.89	1.87		
8	4.58	3.82	3.39	3.10	2.90	2.71	2.62	2.53	2.45	2.39	2.33	2.28	2.24	2.20	2.17	2.14	2.12	2.09	2.07	2.05	2.04	2.02	2.01	2.00	1.99	1.99	1.97	1.95	1.94	1.90	1.87	1.84	1.82	1.80	1.78	1.76	
9	4.41	3.69	3.27	2.99	2.79	2.64	2.53	2.44	2.36	2.29	2.24	2.19	2.15	2.11	2.08	2.05	2.03	2.01	1.99	1.97	1.95	1.93	1.92	1.91	1.90	1.89	1.87	1.86	1.85	1.81	1.78	1.75	1.74	1.71	1.69	1.67	
10	4.28	3.58	3.17	2.90	2.71	2.56	2.45	2.36	2.28	2.22	2.16	2.12	2.08	2.04	2.01	1.98	1.96	1.93	1.91	1.89	1.87	1.86	1.85	1.84	1.83	1.81	1.80	1.79	1.78	1.74	1.71	1.68	1.66	1.64	1.63	1.61	
11	4.18	3.49	3.09	2.83	2.64	2.50	2.39	2.29	2.22	2.16	2.10	2.05	2.01	1.98	1.95	1.92	1.89	1.86	1.84	1.82	1.79	1.77	1.75	1.73	1.72	1.71	1.69	1.68	1.67	1.66	1.61	1.57	1.55	1.54	1.51	1.48	1.47
12	4.10	3.42	3.03	2.77	2.58	2.44	2.33	2.24	2.16	2.10	2.05	2.00	1.96	1.92	1.89	1.86	1.84	1.82	1.79	1.77	1.75	1.73	1.72	1.71	1.69	1.67	1.66	1.65	1.64	1.62	1.61	1.57	1.55	1.54	1.51	1.48	1.47
13	4.03	3.36	2.98	2.72	2.53	2.39	2.28	2.19	2.12	2.05	2.00	1.95	1.91	1.88	1.85	1.82	1.79	1.77	1.75	1.73	1.71	1.70	1.68	1.66	1.65	1.64	1.63	1.62	1.61	1.59	1.58	1.53	1.51	1.49	1.47	1.45	1.43
14	3.97	3.31	2.93	2.67	2.49	2.35	2.24	2.15	2.08	2.01	1.96	1.91	1.87	1.84	1.81	1.78	1.75	1.73	1.71	1.70	1.68	1.66	1.65	1.64	1.63	1.62	1.61	1.59	1.58	1.53	1.51	1.49	1.47	1.45	1.43	1.41	1.39
15	3.92	3.27	2.89	2.64	2.45	2.31	2.20	2.11	2.04	1.98	1.92	1.88	1.84	1.80	1.77	1.74	1.72	1.70	1.68	1.66	1.65	1.64	1.63	1.62	1.61	1.59	1.58	1.56	1.55	1.51	1.49	1.47	1.45	1.43	1.41	1.39	1.37
16	3.87	3.23	2.85	2.60	2.42	2.28	2.17	2.08	2.01	1.95	1.89	1.85	1.81	1.77	1.74	1.71	1.69	1.66	1.64	1.63	1.62	1.61	1.60	1.59	1.57	1.56	1.55	1.54	1.53	1.52	1.51	1.50	1.46	1.43	1.41	1.39	1.37
17	3.84	3.20	2.82	2.57	2.39	2.25	2.14	2.05	1.98	1.92	1.86	1.82	1.78	1.74	1.71	1.69	1.66	1.64	1.63	1.62	1.61	1.60	1.59	1.57	1.56	1.55	1.54	1.53	1.52	1.51	1.50	1.46	1.43	1.41	1.39	1.37	1.35
18	3.80	3.17	2.79	2.55	2.36	2.23	2.12	2.03	1.96	1.90	1.84	1.79	1.75	1.72	1.69	1.66	1.64	1.63	1.62	1.61	1.60	1.59	1.57	1.56	1.55	1.54	1.53	1.52	1.51	1.50	1.46	1.43	1.41	1.39	1.37	1.35	1.33
19	3.77	3.14	2.77	2.52	2.34	2.20	2.09	2.01	1.93	1.87	1.82	1.77	1.73	1.70	1.67	1.64	1.62	1.60	1.58	1.56	1.54	1.53	1.52	1.51	1.50	1.49	1.47	1.46	1.45	1.43	1.42	1.41	1.40	1.39	1.38	1.37	1.36
20	3.75	3.12	2.75	2.50	2.32	2.18	2.07	1.99	1.91	1.85	1.79	1.75	1.71	1.68	1.65	1.63	1.61	1.59	1.57	1.55	1.54	1.53	1.52	1.51	1.50	1.49	1.47	1.46	1.45	1.43	1.42	1.41	1.40	1.39	1.38	1.37	1.36
21	3.73	3.10	2.73	2.48	2.30	2.16	2.05	1.97	1.89	1.83	1.78	1.73	1.70	1.66	1.64	1.62	1.60	1.58	1.56	1.54	1.53	1.52	1.51	1.50	1.49	1.47	1.46	1.45	1.43	1.42	1.41	1.40	1.39	1.38	1.37	1.36	1.35
22	3.70	3.07	2.71	2.46	2.28	2.15	2.04	1.95	1.87	1.81	1.76	1.72	1.68	1.63	1.60	1.57	1.55	1.53	1.51	1.49	1.48	1.47	1.46	1.45	1.44	1.43	1.42	1.41	1.40	1.39	1.37	1.36	1.35	1.34	1.33	1.32	1.31
23	3.69	3.06	2.69	2.45	2.27	2.13	2.02	1.93	1.86	1.80	1.75	1.71	1.67	1.63	1.59	1.56	1.53	1.50	1.48	1.46	1.45	1.44	1.43	1.42	1.41	1.40	1.39	1.37	1.36	1.34	1.33	1.32	1.31	1.30	1.29	1.28	1.27
24	3.67	3.04	2.68	2.43	2.25	2.12	2.01	1.92	1.85	1.79	1.74	1.69	1.65	1.61	1.57	1.54	1.51	1.49	1.47	1.45	1.44	1.43	1.42	1.41	1.40	1.39	1.37	1.36	1.34	1.33	1.32	1.31	1.30	1.29	1.28	1.27	1.26
25	3.65	3.03	2.66	2.42	2.24	2.10	2.00	1.91	1.84	1.78	1.73	1.68	1.64	1.60	1.56	1.52	1.50	1.47	1.45	1.44	1.43	1.42	1.41	1.40	1.39	1.37	1.36	1.34	1.33	1.32	1.31	1.30	1.29	1.28	1.27	1.26	1.25
26	3.64	3.02	2.65	2.40	2.23	2.09	1.99	1.90	1.83	1.77	1.72	1.66	1.62	1.58	1.54	1.51	1.49	1.46	1.44	1.42	1.41	1.40	1.39	1.37	1.36	1.34	1.33	1.32	1.31	1.30	1.29	1.28	1.27	1.26	1.25	1.24	1.23
27	3.62	3.00	2.64	2.39	2.22	2.08	1.98	1.89	1.81	1.74	1.69	1.64	1.60	1.56	1.52	1.50	1.47	1.45	1.42	1.40	1.39	1.37	1.36	1.35	1.34	1.33	1.32	1.31	1.30	1.29	1.27	1.26	1.25	1.24	1.23	1.22	1.21
28	3.61	2.99	2.63	2.38	2.21	2.07	1.97	1.87	1.80	1.74	1.69	1.64	1.60	1.56	1.52	1.50	1.47	1.45	1.42	1.40	1.39	1.37	1.36	1.35	1.34	1.33	1.32	1.31	1.30	1.29	1.27	1.26	1.25	1.24	1.23	1.22	1.21
29	3.60	2.98	2.62	2.37	2.20	2.05	1.95	1.86	1.79	1.73	1.67	1.62	1.58	1.54	1.51	1.48	1.45	1.42	1.40	1.39	1.37	1.36	1.35	1.34	1.33	1.32	1.31	1.30	1.29	1.27	1.26	1.25	1.24	1.23	1.22	1.21	1.20
30	3.59	2.98	2.62	2.37	2.20	2.05	1.94	1.85	1.78	1.72	1.66	1.61	1.57	1.53	1.50	1.46	1.44	1.41	1.39	1.37	1.35	1.33	1.32	1.31	1.30	1.29	1.27	1.26	1.25	1.24	1.23	1.22	1.21	1.20	1.19	1.18	1.17
35	3.54	2.93	2.57	2.33	2.15	2.01	1.90	1.81	1.74	1.68	1.61	1.57	1.53	1.49	1.46	1.42	1.39	1.37	1.35	1.33	1.32	1.31	1.30	1.29	1.27	1.26	1.25	1.24	1.23	1.22	1.21	1.20	1.19	1.18	1.17	1.16	1.15
40	3.51	2.90	2.54	2.30	2.12	1.98	1.87	1.78	1.71	1.64	1.58	1.53	1.49	1.46	1.42	1.39	1.36	1.34	1.33	1.32	1.31	1.30	1.29	1.27	1.26	1.25	1.24	1.23	1.22	1.21	1.20	1.19	1.18	1.17	1.16	1.15	1.14
45	3.49	2.88	2.52	2.27	2.10	1.95	1.84	1.75	1.68	1.62	1.56	1.51	1.47	1.43	1.39	1.36	1.33	1.31	1.29	1.28	1.27	1.26	1.25	1.24	1.23	1.22	1.21	1.20	1.19	1.18	1.17	1.16	1.15	1.14	1.13	1.12	1.11
50	3.47	2.86	2.50	2.25	2.08	1.93	1.82	1.74	1.66	1.60	1.54	1.49	1.45	1.41	1.37	1.34	1.31	1.29	1.28	1.27	1.26	1.25	1.24	1.23	1.22	1.21	1.20	1.19	1.18	1.17	1.16	1.15	1.14	1.13	1.12	1.11	1.10
60	3.44	2.83	2.47	2.22	2.05	1.91	1.80	1.71	1.63	1.57	1.51	1.46	1.41	1.37	1.34	1.31	1.29	1.28	1.27	1.26	1.25	1.24	1.23	1.22	1.21	1.20	1.19	1.18	1.17	1.16	1.15	1.14	1.13	1.12	1.11	1.10	1.09
70	3.42	2.81	2.45	2.20	2.03	1.89	1.78	1.69	1.61	1.55	1.48	1.43	1.39	1.35	1.32	1.28	1.25	1.23	1.22	1.21	1.20	1.19	1.18	1.17	1.16	1.15	1.14	1.13	1.12								

T A B L E 7

Single-sided test $\alpha = .01$ $\beta = .05$ Double-sided test $\alpha = .02$

	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	35	40	45	50	55	60	70	80
2	9.88	6.29	5.09	4.50	4.15	3.92	3.76	3.64	3.54	3.47	3.41	3.36	3.31	3.25	3.22	3.19	3.17	3.15	3.14	3.12	3.11	3.09	3.08	3.07	3.06	3.05	3.04	3.03	3.00	2.98	2.96	2.94	2.92	2.90	2.89		
3	6.29	4.80	4.11	3.71	3.46	3.28	3.15	3.04	2.97	2.91	2.85	2.81	2.77	2.74	2.71	2.68	2.66	2.64	2.62	2.61	2.59	2.58	2.57	2.56	2.55	2.54	2.53	2.52	2.52	2.48	2.46	2.44	2.42	2.40	2.39	2.38	
4	5.09	4.11	3.60	3.28	3.07	2.92	2.80	2.71	2.64	2.58	2.53	2.49	2.45	2.42	2.40	2.37	2.35	2.33	2.31	2.30	2.28	2.27	2.26	2.25	2.24	2.23	2.22	2.22	2.21	2.18	2.15	2.13	2.12	2.10	2.08	2.07	
5	4.50	3.71	3.28	3.01	2.82	2.68	2.57	2.49	2.42	2.37	2.32	2.28	2.24	2.21	2.19	2.16	2.14	2.12	2.11	2.09	2.08	2.07	2.05	2.04	2.03	2.02	2.02	2.01	2.01	1.97	1.95	1.93	1.91	1.89	1.87	1.86	
6	4.15	3.46	3.07	2.82	2.64	2.51	2.41	2.33	2.26	2.21	2.16	2.13	2.09	2.06	2.04	2.01	1.99	1.97	1.96	.94	1.93	1.91	1.90	1.89	1.88	1.87	1.86	1.86	1.82	1.80	1.78	1.76	1.74	1.72	1.71		
7	3.92	3.28	2.92	2.68	2.51	2.39	2.29	2.21	2.15	2.09	2.05	2.01	1.98	1.95	1.92	1.90	1.88	1.86	1.84	1.83	1.81	1.80	1.79	1.78	1.77	1.76	1.76	1.75	1.73	1.70	1.68	1.66	1.64	1.62	1.60	1.59	
8	3.76	3.15	2.80	2.57	2.41	2.29	2.19	2.12	2.05	2.00	1.96	1.92	1.88	1.86	1.83	1.81	1.79	1.77	1.75	1.74	1.72	1.71	1.70	1.69	1.68	1.67	1.67	1.65	1.64	1.61	1.58	1.57	1.55	1.53	1.51	1.50	
9	3.64	3.05	2.71	2.49	2.33	2.21	2.12	2.04	1.98	1.93	1.88	1.84	1.81	1.78	1.76	1.73	1.71	1.69	1.68	1.66	1.65	1.63	1.62	1.61	1.61	1.60	1.58	1.57	1.55	1.53	1.51	1.49	1.47	1.45	1.43	1.42	
10	3.54	2.97	2.64	2.42	2.26	2.15	2.05	1.98	1.92	1.86	1.82	1.78	1.75	1.72	1.69	1.67	1.65	1.63	1.61	1.60	1.58	1.57	1.56	1.55	1.55	1.54	1.52	1.51	1.49	1.47	1.45	1.43	1.41	1.39	1.37	1.35	
11	3.47	2.91	2.58	2.37	2.22	2.09	2.11	1.93	1.86	1.81	1.77	1.73	1.70	1.67	1.64	1.62	1.60	1.58	1.56	1.55	1.53	1.52	1.51	1.50	1.48	1.47	1.46	1.44	1.42	1.40	1.38	1.36	1.34	1.32	1.30	1.28	
12	3.41	2.85	2.53	2.32	2.16	2.05	1.96	1.88	1.82	1.77	1.72	1.69	1.65	1.62	1.60	1.57	1.55	1.53	1.52	1.50	1.49	1.48	1.47	1.45	1.44	1.43	1.42	1.40	1.38	1.36	1.34	1.32	1.30	1.28	1.26	1.25	
13	3.36	2.81	2.49	2.28	2.13	2.01	1.92	1.84	1.78	1.73	1.69	1.65	1.61	1.59	1.56	1.54	1.51	1.50	1.48	1.47	1.45	1.44	1.42	1.41	1.40	1.39	1.37	1.36	1.34	1.32	1.30	1.28	1.26	1.24	1.22	1.21	
14	3.31	2.77	2.45	2.24	2.09	1.98	1.88	1.81	1.75	1.70	1.65	1.61	1.58	1.55	1.53	1.50	1.48	1.46	1.45	1.43	1.42	1.40	1.39	1.38	1.37	1.36	1.34	1.33	1.31	1.30	1.28	1.26	1.24	1.22	1.20	1.18	
15	3.28	2.74	2.42	2.21	2.06	1.95	1.86	1.78	1.72	1.67	1.62	1.59	1.55	1.52	1.50	1.47	1.45	1.43	1.42	1.40	1.38	1.37	1.36	1.35	1.34	1.33	1.31	1.30	1.28	1.26	1.24	1.22	1.20	1.18	1.16	1.14	
16	3.25	2.71	2.40	2.19	2.04	1.92	1.83	1.76	1.69	1.64	1.60	1.56	1.53	1.50	1.47	1.45	1.43	1.41	1.39	1.36	1.35	1.33	1.32	1.31	1.29	1.28	1.27	1.26	1.25	1.23	1.22	1.20	1.18	1.16	1.14	1.12	
17	3.22	2.68	2.37	2.16	2.01	1.90	1.81	1.73	1.67	1.62	1.57	1.54	1.50	1.47	1.45	1.43	1.40	1.38	1.36	1.34	1.33	1.31	1.30	1.28	1.27	1.26	1.25	1.24	1.23	1.22	1.20	1.18	1.16	1.14	1.12	1.10	
18	3.19	2.66	2.35	2.14	1.99	1.88	1.79	1.71	1.65	1.60	1.55	1.51	1.48	1.45	1.43	1.40	1.38	1.36	1.34	1.32	1.31	1.29	1.27	1.26	1.25	1.24	1.23	1.22	1.21	1.20	1.16	1.13	1.11	1.09	1.07	1.04	
19	3.17	2.64	2.33	2.12	1.97	1.86	1.77	1.69	1.63	1.58	1.53	1.50	1.46	1.43	1.41	1.39	1.36	1.34	1.32	1.31	1.29	1.27	1.26	1.24	1.23	1.22	1.21	1.20	1.19	1.18	1.14	1.11	1.09	1.07	1.05	1.02	
20	3.15	2.62	2.31	2.11	1.96	1.84	1.75	1.68	1.61	1.56	1.52	1.48	1.45	1.42	1.39	1.36	1.34	1.32	1.31	1.29	1.27	1.26	1.24	1.23	1.22	1.21	1.20	1.19	1.18	1.16	1.13	1.11	1.09	1.07	1.05	1.02	
21	3.14	2.61	2.30	2.09	1.94	1.83	1.74	1.66	1.60	1.55	1.50	1.47	1.43	1.40	1.37	1.35	1.33	1.31	1.29	1.27	1.25	1.24	1.23	1.22	1.21	1.20	1.19	1.18	1.17	1.16	1.14	1.11	1.09	1.07	1.05	1.02	
22	3.12	2.59	2.28	2.08	1.93	1.81	1.72	1.65	1.58	1.53	1.48	1.45	1.42	1.38	1.36	1.34	1.32	1.30	1.27	1.26	1.24	1.22	1.21	1.20	1.19	1.18	1.17	1.16	1.15	1.13	1.12	1.10	1.09	1.07	1.05	1.02	
23	3.11	2.58	2.27	2.07	1.91	1.80	1.71	1.63	1.57	1.52	1.48	1.44	1.40	1.37	1.34	1.32	1.30	1.27	1.26	1.24	1.22	1.21	1.20	1.19	1.18	1.17	1.16	1.15	1.14	1.11	1.08	1.06	1.04	1.01	.99	.97	
24	3.09	2.57	2.26	2.05	1.90	1.79	1.70	1.62	1.56	1.51	1.47	1.42	1.39	1.36	1.33	1.31	1.28	1.26	1.24	1.23	1.22	1.20	1.19	1.18	1.17	1.16	1.15	1.13	1.12	1.11	1.09	1.06	1.04	1.01	.98	.94	
25	3.08	2.56	2.25	2.04	1.89	1.78	1.69	1.61	1.55	1.50	1.45	1.42	1.38	1.35	1.32	1.29	1.27	1.25	1.23	1.22	1.20	1.19	1.17	1.16	1.15	1.13	1.12	1.11	1.10	1.09	1.05	1.02	1.00	.98	.95	.91	
26	3.07	2.55	2.24	2.03	1.88	1.77	1.68	1.61	1.55	1.48	1.44	1.40	1.37	1.34	1.30	1.28	1.26	1.24	1.22	1.20	1.19	1.17	1.16	1.15	1.13	1.12	1.11	1.10	1.09	1.08	1.04	1.01	.99	.97	.94	.91	
27	3.06	2.54	2.23	2.02	1.87	1.76	1.67	1.60	1.53	1.48	1.43	1.39	1.36	1.32	1.30	1.27	1.25	1.23	1.22	1.20	1.19	1.17	1.16	1.15	1.13	1.12	1.11	1.09	1.08	1.07	1.03	1.00	.97	.94	.91	.90	
28	3.05	2.53	2.22	2.02	1.87	1.76	1.67	1.58	1.52	1.47	1.42	1.39	1.34	1.31	1.28	1.25	1.23	1.21	1.19	1.17	1.16	1.14	1.13	1.12	1.11	1.09	1.08	1.07	1.06	1.02	1.00	.96	.94	.91	.89		
29	3.04	2.52	2.22	2.01	1.86	1.75	1.65	1.58	1.51	1.46	1.42	1.37	1.34	1.31	1.28	1.25	1.23	1.21	1.19	1.17	1.16	1.14	1.13	1.12	1.10	1.09	1.08	1.07	1.06	1.02	.99	.96	.94	.91	.89		
30	3.03	2.52	2.21	2.01	1.86	1.73	1.64	1.57	1.51	1.46	1.40	1.36	1.33	1.30	1.27	1.24	1.22	1.20	1.18	1.16	1.14	1.13	1.12	1.10	1.09	1.08	1.07	1.06	1.05	1.01	.98	.95	.93	.90	.88		
35	3.00	2.48	2.18	1.97	1.82	1.70	1.61	1.53	1.47	1.42	1.37	1.33	1.29	1.26	1.23	1.21	1.18	1.15	1.13	1.11	1.09	1.08	1.07	1.05	1.04	1.03	1.02	1.01	.97	.94	.91	.89	.86	.83	.82		
40	2.98	2.46	2.15	1.95	1.80	1.68	1.58	1.51	1.45	1.39	1.34	1.30	1.27	1.23	1.21	1.18	1.15	1.13	1.11	1.09	1.07	1.06	1.04	1.03	1.01	1.00	.99	.98	.94	.91	.88	.86	.82	.80	.78		
45																																					

Value of $D = \delta/S_p$

T A B L E 8

Single-sided test $\alpha = .01$ $\beta = .10$ Double-sided test $\alpha = .02$

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	35	40	45	50	60	70	80
1	0.05	5.64	4.57	4.05	3.74	3.54	3.39	3.29	3.20	3.14	3.08	3.04	3.00	2.97	2.94	2.92	2.89	2.87	2.86	2.84	2.83	2.82	2.80	2.79	2.78	2.77	2.76	2.75	2.72	2.70	2.68	2.67	2.65	2.64	2.63		
2	5.64	4.31	3.70	3.35	3.12	2.96	2.85	2.76	2.69	2.63	2.58	2.54	2.51	2.48	2.45	2.43	2.41	2.39	2.38	2.36	2.35	2.34	2.33	2.32	2.31	2.30	2.29	2.28	2.25	2.23	2.21	2.20	2.18	2.17	2.16		
3	4.57	3.70	3.24	2.96	2.77	2.63	2.53	2.45	2.39	2.34	2.29	2.25	2.22	2.19	2.17	2.15	2.13	2.11	2.10	2.08	2.07	2.06	2.05	2.04	2.03	2.02	2.01	2.01	1.98	1.95	1.94	1.92	1.90	1.89	1.88		
4	4.05	3.35	2.96	2.72	2.55	2.42	2.33	2.25	2.19	2.14	2.10	2.06	2.03	2.00	1.98	1.96	1.94	1.92	1.91	1.90	1.88	1.87	1.86	1.85	1.84	1.83	1.82	1.82	1.79	1.77	1.75	1.74	1.72	1.70	1.69		
5	3.74	3.12	2.77	2.55	2.39	2.27	2.18	2.11	2.05	2.00	1.96	1.92	1.89	1.87	1.84	1.82	1.81	1.79	1.77	1.76	1.75	1.74	1.73	1.72	1.71	1.70	1.69	1.68	1.65	1.63	1.61	1.60	1.58	1.56	1.55		
6	3.54	2.96	2.63	2.42	2.27	2.16	2.07	2.00	1.94	1.90	1.85	1.82	1.79	1.76	1.74	1.72	1.70	1.68	1.67	1.66	1.64	1.63	1.62	1.61	1.60	1.59	1.59	1.57	1.54	1.52	1.50	1.49	1.47	1.46	1.45		
7	3.39	2.96	2.63	2.42	2.27	2.16	2.07	2.00	1.94	1.90	1.85	1.82	1.79	1.76	1.74	1.72	1.70	1.68	1.67	1.66	1.64	1.63	1.62	1.61	1.60	1.59	1.59	1.57	1.54	1.52	1.50	1.49	1.47	1.46	1.45		
8	3.29	2.76	2.45	2.25	2.11	2.00	1.92	1.85	1.79	1.74	1.69	1.65	1.62	1.59	1.56	1.54	1.51	1.50	1.48	1.47	1.45	1.44	1.43	1.42	1.41	1.40	1.39	1.38	1.37	1.34	1.33	1.32	1.31	1.30	1.29		
9	3.20	2.69	2.39	2.19	2.05	1.94	1.86	1.79	1.74	1.69	1.65	1.62	1.59	1.56	1.54	1.51	1.50	1.48	1.47	1.45	1.44	1.43	1.42	1.41	1.40	1.39	1.38	1.37	1.34	1.33	1.32	1.31	1.29	1.28	1.27		
10	3.14	2.63	2.34	2.14	2.00	1.90	1.82	1.74	1.69	1.64	1.60	1.57	1.54	1.51	1.49	1.47	1.45	1.43	1.42	1.40	1.39	1.38	1.37	1.36	1.35	1.34	1.33	1.32	1.30	1.29	1.27	1.26	1.25	1.24	1.23		
11	3.08	2.58	2.29	2.10	1.96	1.85	1.77	1.71	1.65	1.60	1.56	1.53	1.50	1.47	1.45	1.43	1.41	1.39	1.38	1.36	1.35	1.34	1.33	1.32	1.31	1.29	1.28	1.27	1.26	1.24	1.23	1.22	1.21	1.20	1.19		
12	3.04	2.54	2.25	2.06	1.92	1.82	1.74	1.67	1.62	1.57	1.53	1.49	1.46	1.44	1.41	1.39	1.37	1.36	1.34	1.33	1.32	1.31	1.29	1.28	1.27	1.26	1.25	1.24	1.23	1.22	1.21	1.20	1.19	1.18	1.17		
13	3.00	2.51	2.22	2.03	1.89	1.79	1.71	1.64	1.59	1.54	1.50	1.46	1.43	1.41	1.38	1.36	1.34	1.33	1.31	1.30	1.29	1.27	1.26	1.25	1.24	1.23	1.22	1.21	1.20	1.19	1.18	1.17	1.16	1.15	1.14		
14	2.97	2.48	2.19	2.00	1.87	1.76	1.68	1.61	1.56	1.51	1.47	1.44	1.41	1.38	1.36	1.34	1.33	1.31	1.30	1.29	1.27	1.26	1.25	1.24	1.23	1.22	1.21	1.20	1.19	1.18	1.17	1.16	1.15	1.14	1.13		
15	2.94	2.45	2.17	1.98	1.84	1.73	1.65	1.58	1.53	1.48	1.44	1.41	1.38	1.36	1.34	1.33	1.31	1.30	1.29	1.27	1.26	1.25	1.24	1.23	1.22	1.21	1.20	1.19	1.18	1.17	1.16	1.15	1.14	1.13	1.12		
16	2.92	2.43	2.15	1.96	1.82	1.72	1.64	1.57	1.51	1.46	1.42	1.39	1.36	1.34	1.33	1.31	1.30	1.29	1.27	1.26	1.25	1.24	1.23	1.22	1.21	1.20	1.19	1.18	1.17	1.16	1.15	1.14	1.13	1.12	1.11		
17	2.89	2.41	2.13	1.94	1.81	1.70	1.62	1.55	1.50	1.45	1.41	1.38	1.36	1.34	1.33	1.31	1.30	1.29	1.27	1.26	1.25	1.24	1.23	1.22	1.21	1.20	1.19	1.18	1.17	1.16	1.15	1.14	1.13	1.12	1.11		
18	2.87	2.39	2.11	1.92	1.79	1.69	1.60	1.54	1.48	1.43	1.39	1.36	1.34	1.33	1.31	1.30	1.29	1.27	1.26	1.25	1.24	1.23	1.22	1.21	1.20	1.19	1.18	1.17	1.16	1.15	1.14	1.13	1.12	1.11	1.10		
19	2.86	2.38	2.10	1.91	1.77	1.67	1.59	1.52	1.46	1.42	1.38	1.36	1.34	1.33	1.31	1.30	1.29	1.27	1.26	1.25	1.24	1.23	1.22	1.21	1.20	1.19	1.18	1.17	1.16	1.15	1.14	1.13	1.12	1.11	1.10		
20	2.84	2.36	2.08	1.90	1.76	1.66	1.57	1.51	1.45	1.40	1.36	1.34	1.33	1.31	1.30	1.29	1.27	1.26	1.25	1.24	1.23	1.22	1.21	1.20	1.19	1.18	1.17	1.16	1.15	1.14	1.13	1.12	1.11	1.10	1.09		
21	2.83	2.35	2.07	1.88	1.75	1.64	1.56	1.49	1.44	1.39	1.35	1.33	1.32	1.30	1.29	1.27	1.26	1.25	1.24	1.23	1.22	1.21	1.20	1.19	1.18	1.17	1.16	1.15	1.14	1.13	1.12	1.11	1.10	1.09	1.08		
22	2.82	2.34	2.06	1.87	1.74	1.63	1.55	1.48	1.43	1.38	1.34	1.32	1.31	1.29	1.27	1.26	1.25	1.24	1.23	1.22	1.21	1.20	1.19	1.18	1.17	1.16	1.15	1.14	1.13	1.12	1.11	1.10	1.09	1.08	1.07		
23	2.80	2.33	2.05	1.86	1.73	1.62	1.54	1.47	1.42	1.37	1.33	1.31	1.30	1.28	1.27	1.26	1.25	1.24	1.23	1.22	1.21	1.20	1.19	1.18	1.17	1.16	1.15	1.14	1.13	1.12	1.11	1.10	1.09	1.08	1.07		
24	2.79	2.32	2.04	1.85	1.72	1.61	1.53	1.46	1.41	1.36	1.32	1.30	1.29	1.27	1.26	1.25	1.24	1.23	1.22	1.21	1.20	1.19	1.18	1.17	1.16	1.15	1.14	1.13	1.12	1.11	1.10	1.09	1.08	1.07	1.06		
25	2.78	2.31	2.03	1.84	1.71	1.60	1.52	1.46	1.40	1.35	1.31	1.29	1.28	1.26	1.25	1.24	1.23	1.22	1.21	1.20	1.19	1.18	1.17	1.16	1.15	1.14	1.13	1.12	1.11	1.10	1.09	1.08	1.07	1.06	1.05		
26	2.77	2.30	2.02	1.83	1.70	1.60	1.52	1.45	1.39	1.34	1.30	1.28	1.27	1.26	1.25	1.24	1.23	1.22	1.21	1.20	1.19	1.18	1.17	1.16	1.15	1.14	1.13	1.12	1.11	1.10	1.09	1.08	1.07	1.06	1.05		
27	2.76	2.29	2.01	1.82	1.69	1.59	1.51	1.43	1.38	1.33	1.29	1.27	1.26	1.25	1.24	1.23	1.22	1.21	1.20	1.19	1.18	1.17	1.16	1.15	1.14	1.13	1.12	1.11	1.10	1.09	1.08	1.07	1.06	1.05	1.04		
28	2.75	2.28	2.00	1.82	1.69	1.59	1.51	1.43	1.38	1.33	1.29	1.27	1.26	1.25	1.24	1.23	1.22	1.21	1.20	1.19	1.18	1.17	1.16	1.15	1.14	1.13	1.12	1.11	1.10	1.09	1.08	1.07	1.06	1.05	1.04		
29	2.74	2.27	1.99	1.81	1.68	1.58	1.50	1.42	1.37	1.32	1.28	1.26	1.25	1.24	1.23	1.22	1.21	1.20	1.19	1.18	1.17	1.16	1.15	1.14	1.13	1.12	1.11	1.10	1.09	1.08	1.07	1.06	1.05	1.04	1.03		
30	2.73	2.26	1.98	1.80	1.67	1.57	1.49	1.41	1.36	1.31	1.27	1.25	1.24	1.23	1.22	1.21	1.20	1.19	1.18	1.17	1.16	1.15	1.14	1.13	1.12	1.11	1.10	1.09	1.08	1.07	1.06	1.05	1.04	1.03	1.02		
31	2.72	2.25	1.97	1.79	1.66	1.56	1.48	1.40	1.35	1.30	1.26	1.24	1.23	1.22	1.21	1.20	1.19	1.18	1.17	1.16	1.15	1.14	1.13	1.12	1.11	1.10	1.09	1.08	1.07	1.06	1.05	1.04	1.03	1.02	1.01		
32	2.71	2.24	1.96	1.78	1.65	1.55	1.47	1.39	1.34	1.29	1.25	1.23	1.22	1.21	1.20	1.19	1.18	1.17	1.16	1.15	1.14	1.13	1.12	1.11	1.10	1.09	1.08	1.07	1.06	1.05	1.04	1.03	1.02	1.01	1.00		
33	2.70	2.23	1.95	1.77	1.64	1.54	1.46	1.38	1.33	1.28	1.24	1.22	1.21	1.20	1.19	1.18	1.17	1.16	1.15	1.14	1.13	1.12	1.11	1.10	1.09	1.08	1.07	1.06	1.05	1.04	1.03	1.02	1.01	1.00	0.99		
34	2.69	2.22	1.94	1.76	1.63	1.53	1.45	1.37	1.32	1.27	1.23	1.21	1.20	1.19	1.18	1.17	1.16	1.15	1.14	1.13	1.12	1.11	1.10	1.09	1.08	1.07	1.06	1.05	1.04	1.03	1.02	1.01	1.00	0.99	0.98		
35	2.68	2.21	1.93	1.75	1.62	1.52	1.44	1.36	1.31	1.26	1.22	1.20	1.19	1.18	1.17	1.16	1.15	1.14	1.13	1.12	1.11	1.10	1.09	1.08	1.07	1.06	1.05	1.04	1.03	1.02	1.01	1.00	0.99	0.98	0.97		
36	2.67	2.20	1.92	1.74	1.61	1.51	1.43	1.35	1.30	1.25	1.21	1.19	1.18	1.17	1.16	1.15	1.14	1.13	1.12	1.11	1.10	1.09	1.08	1.07	1.06	1.05	1.04	1.03	1.02	1.01	1.00	0.99	0.98	0.97	0.96		
37	2.66	2.19	1.91	1.73	1.60	1.50	1.42	1.34	1.29	1.24	1.20	1.18	1.17	1.16	1.15	1.14	1.13</																				

Single-sided test $\alpha = .01$ $\beta = .20$
Double-sided test $\alpha = .02$

Value of $D = \delta/S_p$

T A B L E 10

Single-sided test $\alpha = .01$ $B = .50$

Double-sided test $\alpha = .02$

	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	35	40	45	50	60	70	80
2	6.96	4.15	3.24	2.82	2.57	2.40	2.29	2.21	2.14	2.09	2.05	2.01	1.98	1.96	1.94	1.92	1.90	1.89	1.87	1.86	1.85	1.84	1.83	1.83	1.82	1.81	1.81	1.80	1.79	1.77	1.76	1.74	1.73	1.72	1.71	1.70
3	4.15	3.06	2.57	2.30	2.12	2.00	1.91	1.84	1.79	1.75	1.71	1.68	1.66	1.63	1.62	1.60	1.59	1.57	1.56	1.55	1.54	1.53	1.52	1.51	1.51	1.50	1.50	1.49	1.47	1.45	1.44	1.43	1.41	1.40	1.40	
4	3.24	2.57	2.22	2.01	1.87	1.77	1.69	1.63	1.59	1.55	1.51	1.49	1.46	1.44	1.43	1.41	1.40	1.39	1.37	1.36	1.35	1.34	1.33	1.32	1.32	1.31	1.31	1.31	1.29	1.27	1.26	1.25	1.23	1.22	1.22	
5	2.82	2.30	2.01	1.83	1.71	1.62	1.55	1.50	1.45	1.42	1.39	1.36	1.34	1.32	1.30	1.29	1.27	1.26	1.25	1.24	1.23	1.22	1.22	1.21	1.20	1.20	1.19	1.19	1.17	1.15	1.14	1.13	1.11	1.10	1.09	
6	2.57	2.12	1.87	1.71	1.60	1.51	1.45	1.40	1.36	1.32	1.29	1.27	1.25	1.23	1.21	1.20	1.18	1.17	1.16	1.15	1.14	1.13	1.12	1.12	1.11	1.11	1.10	1.10	1.08	1.06	1.05	1.04	1.02	1.01	1.00	
7	2.40	2.00	1.77	1.62	1.51	1.43	1.37	1.32	1.28	1.25	1.22	1.20	1.18	1.16	1.14	1.13	1.11	1.10	1.09	1.08	1.07	1.06	1.05	1.05	1.04	1.04	1.03	1.03	1.02	1.00	99	98	97	95	94	
8	2.29	1.91	1.69	1.55	1.45	1.37	1.31	1.26	1.23	1.19	1.16	1.14	1.12	1.10	1.09	1.07	1.06	1.05	1.04	1.03	1.02	1.01	1.00	1.00	99	99	98	97	96	95	94	93	92	91	90	
9	2.21	1.84	1.63	1.50	1.40	1.32	1.26	1.22	1.18	1.15	1.12	1.10	1.08	1.06	1.04	1.03	1.01	1.00	99	98	97	96	95	94	93	92	91	90	89	88	87	86	85	84	83	
10	2.14	1.79	1.59	1.45	1.36	1.28	1.23	1.19	1.15	1.11	1.08	1.06	1.04	1.02	1.00	99	98	97	96	95	94	93	92	91	90	89	88	87	86	85	84	83	82	81	80	
11	2.09	1.75	1.55	1.42	1.32	1.25	1.19	1.15	1.11	1.08	1.05	1.03	1.01	99	98	97	96	95	94	93	92	91	90	89	88	87	86	85	84	83	82	81	80	79	78	
12	2.05	1.71	1.51	1.39	1.29	1.22	1.16	1.12	1.08	1.05	1.02	1.00	98	96	95	94	93	92	91	90	89	88	87	86	85	84	83	82	81	80	79	78	77	76	75	
13	2.01	1.68	1.49	1.36	1.27	1.20	1.14	1.10	1.06	1.03	1.00	98	96	95	94	93	92	91	90	89	88	87	86	85	84	83	82	81	80	79	78	77	76	75	74	
14	1.98	1.66	1.46	1.34	1.25	1.18	1.12	1.08	1.04	1.01	98	96	95	94	93	92	91	90	89	88	87	86	85	84	83	82	81	80	79	78	77	76	75	74	73	
15	1.96	1.63	1.44	1.32	1.23	1.16	1.10	1.06	1.02	99	96	94	92	90	88	87	86	85	84	83	82	81	80	79	78	77	76	75	74	73	72	71	70	69	68	
16	1.94	1.62	1.43	1.30	1.21	1.14	1.09	1.04	1.00	97	95	92	90	88	87	86	85	84	83	82	81	80	79	78	77	76	75	74	73	72	71	70	69	68	67	
17	1.92	1.60	1.41	1.29	1.20	1.13	1.07	1.03	99	96	93	91	89	87	86	85	84	83	82	81	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	
18	1.90	1.58	1.40	1.27	1.18	1.11	1.06	1.01	98	95	92	90	88	86	85	84	83	82	81	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	
19	1.89	1.57	1.39	1.26	1.17	1.10	1.05	1.00	97	93	91	89	87	85	84	83	82	81	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64	
20	1.87	1.56	1.37	1.25	1.16	1.09	1.04	99	96	92	90	88	86	84	82	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64	63	62	61	
21	1.86	1.55	1.36	1.24	1.15	1.08	1.03	98	95	91	89	87	85	83	81	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64	63	62	61	
22	1.85	1.54	1.35	1.23	1.14	1.07	1.02	97	94	91	89	87	85	83	81	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64	63	62	61	
23	1.84	1.53	1.35	1.22	1.13	1.06	1.01	97	93	90	87	85	83	81	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64	63	62	61	60	
24	1.83	1.52	1.34	1.22	1.12	1.06	1.00	96	92	89	87	84	82	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64	63	62	61	60	59	
25	1.83	1.51	1.33	1.21	1.12	1.05	1.00	95	92	89	86	84	82	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64	63	62	61	60	59	
26	1.82	1.51	1.32	1.20	1.11	1.05	99	95	91	88	85	83	81	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64	63	62	61	60	59	58	
27	1.81	1.50	1.32	1.20	1.11	1.04	99	95	91	88	85	83	81	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64	63	62	61	60	59	58	
28	1.81	1.50	1.31	1.19	1.11	1.04	98	93	90	87	84	82	80	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64	63	62	61	60	59	58	57	
29	1.80	1.49	1.31	1.19	1.10	1.03	97	93	90	87	84	82	80	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64	63	62	61	60	59	58	57	
30	1.79	1.49	1.31	1.19	1.10	1.02	97	93	90	87	84	82	80	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64	63	62	61	60	59	58	57	
35	1.77	1.47	1.29	1.17	1.08	1.00	95	91	87	84	81	79	77	75	74	73	72	71	70	69	68	67	66	65	64	63	62	61	60	59	58	57	56	55		
40	1.76	1.45	1.27	1.15	1.06	99	93	89	85	82	79	77	75	73	71	70	69	68	67	66	65	64	63	62	61	60	59	58	57	56	55	54	53	52		
45	1.74	1.44	1.26	1.14	1.05	96	92	88	84	81	78	76	74	72	70	69	68	67	66	65	64	63	62	61	60	59	58	57	56	55	54	53	52	51		
50	1.73	1.43	1.25	1.13	1.04	97	91	87	83	80	77	74	72	70	69	68	67	66	65	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50		
60	1.72	1.41	1.23	1.11	1.02	95	90	86	82	79	76	73	71	69	68	67	66	65	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49		
70	1.71	1.40	1.22	1.10	1.01	94	89	84	80	77	74	72	70	68	67	66	65	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48		
80	1.70	1.40	1.22	1.09	1.00	94	88	83	80	76	73	71	69	67	66	65	64	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48	47		

Value of $D = \epsilon/S_p$

TABLE 11

Single-sided test $\alpha = .025$ $\beta = .01$
 Double-sided test $\alpha = .05$

Double-sided test $\alpha = .05$																																						
	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	35	40	45	50	60	70	80		
2	11.27	7.05	5.65	4.97	4.36	4.00	3.73	3.52	3.37	3.24	3.12	3.01	2.91	2.81	2.71	2.61	2.51	2.41	2.31	2.21	2.11	2.01	1.91	1.81	1.71	1.61	1.51	1.41	1.31	1.21	1.11	1.01	0.91	0.81	0.71	0.61		
3	7.05	5.65	4.97	4.36	4.00	3.73	3.52	3.37	3.24	3.12	3.01	2.91	2.81	2.71	2.61	2.51	2.41	2.31	2.21	2.11	2.01	1.91	1.81	1.71	1.61	1.51	1.41	1.31	1.21	1.11	1.01	0.91	0.81	0.71	0.61			
4	5.65	4.97	4.36	4.00	3.73	3.52	3.37	3.24	3.12	3.01	2.91	2.81	2.71	2.61	2.51	2.41	2.31	2.21	2.11	2.01	1.91	1.81	1.71	1.61	1.51	1.41	1.31	1.21	1.11	1.01	0.91	0.81	0.71	0.61				
5	4.97	4.36	4.00	3.73	3.52	3.37	3.24	3.12	3.01	2.91	2.81	2.71	2.61	2.51	2.41	2.31	2.21	2.11	2.01	1.91	1.81	1.71	1.61	1.51	1.41	1.31	1.21	1.11	1.01	0.91	0.81	0.71	0.61					
6	4.36	4.00	3.73	3.52	3.37	3.24	3.12	3.01	2.91	2.81	2.71	2.61	2.51	2.41	2.31	2.21	2.11	2.01	1.91	1.81	1.71	1.61	1.51	1.41	1.31	1.21	1.11	1.01	0.91	0.81	0.71	0.61						
7	4.00	3.73	3.52	3.37	3.24	3.12	3.01	2.91	2.81	2.71	2.61	2.51	2.41	2.31	2.21	2.11	2.01	1.91	1.81	1.71	1.61	1.51	1.41	1.31	1.21	1.11	1.01	0.91	0.81	0.71	0.61							
8	3.73	3.52	3.37	3.24	3.12	3.01	2.91	2.81	2.71	2.61	2.51	2.41	2.31	2.21	2.11	2.01	1.91	1.81	1.71	1.61	1.51	1.41	1.31	1.21	1.11	1.01	0.91	0.81	0.71	0.61								
9	3.52	3.37	3.24	3.12	3.01	2.91	2.81	2.71	2.61	2.51	2.41	2.31	2.21	2.11	2.01	1.91	1.81	1.71	1.61	1.51	1.41	1.31	1.21	1.11	1.01	0.91	0.81	0.71	0.61									
10	3.37	3.24	3.12	3.01	2.91	2.81	2.71	2.61	2.51	2.41	2.31	2.21	2.11	2.01	1.91	1.81	1.71	1.61	1.51	1.41	1.31	1.21	1.11	1.01	0.91	0.81	0.71	0.61										
11	3.24	3.12	3.01	2.91	2.81	2.71	2.61	2.51	2.41	2.31	2.21	2.11	2.01	1.91	1.81	1.71	1.61	1.51	1.41	1.31	1.21	1.11	1.01	0.91	0.81	0.71	0.61											
12	3.12	3.01	2.91	2.81	2.71	2.61	2.51	2.41	2.31	2.21	2.11	2.01	1.91	1.81	1.71	1.61	1.51	1.41	1.31	1.21	1.11	1.01	0.91	0.81	0.71	0.61												
13	3.01	2.91	2.81	2.71	2.61	2.51	2.41	2.31	2.21	2.11	2.01	1.91	1.81	1.71	1.61	1.51	1.41	1.31	1.21	1.11	1.01	0.91	0.81	0.71	0.61													
14	2.91	2.81	2.71	2.61	2.51	2.41	2.31	2.21	2.11	2.01	1.91	1.81	1.71	1.61	1.51	1.41	1.31	1.21	1.11	1.01	0.91	0.81	0.71	0.61														
15	2.81	2.71	2.61	2.51	2.41	2.31	2.21	2.11	2.01	1.91	1.81	1.71	1.61	1.51	1.41	1.31	1.21	1.11	1.01	0.91	0.81	0.71	0.61															
16	2.71	2.61	2.51	2.41	2.31	2.21	2.11	2.01	1.91	1.81	1.71	1.61	1.51	1.41	1.31	1.21	1.11	1.01	0.91	0.81	0.71	0.61																
17	2.61	2.51	2.41	2.31	2.21	2.11	2.01	1.91	1.81	1.71	1.61	1.51	1.41	1.31	1.21	1.11	1.01	0.91	0.81	0.71	0.61																	
18	2.51	2.41	2.31	2.21	2.11	2.01	1.91	1.81	1.71	1.61	1.51	1.41	1.31	1.21	1.11	1.01	0.91	0.81	0.71	0.61																		
19	2.41	2.31	2.21	2.11	2.01	1.91	1.81	1.71	1.61	1.51	1.41	1.31	1.21	1.11	1.01	0.91	0.81	0.71	0.61																			
20	2.31	2.21	2.11	2.01	1.91	1.81	1.71	1.61	1.51	1.41	1.31	1.21	1.11	1.01	0.91	0.81	0.71	0.61																				
21	2.21	2.11	2.01	1.91	1.81	1.71	1.61	1.51	1.41	1.31	1.21	1.11	1.01	0.91	0.81	0.71	0.61																					
22	2.11	2.01	1.91	1.81	1.71	1.61	1.51	1.41	1.31	1.21	1.11	1.01	0.91	0.81	0.71	0.61																						
23	2.01	1.91	1.81	1.71	1.61	1.51	1.41	1.31	1.21	1.11	1.01	0.91	0.81	0.71	0.61																							
24	1.91	1.81	1.71	1.61	1.51	1.41	1.31	1.21	1.11	1.01	0.91	0.81	0.71	0.61																								
25	1.81	1.71	1.61	1.51	1.41	1.31	1.21	1.11	1.01	0.91	0.81	0.71	0.61																									
26	1.71	1.61	1.51	1.41	1.31	1.21	1.11	1.01	0.91	0.81	0.71	0.61																										
27	1.61	1.51	1.41	1.31	1.21	1.11	1.01	0.91	0.81	0.71	0.61																											
28	1.51	1.41	1.31	1.21	1.11	1.01	0.91	0.81	0.71	0.61																												
29	1.41	1.31	1.21	1.11	1.01	0.91	0.81	0.71	0.61																													
30	1.31	1.21	1.11	1.01	0.91	0.81	0.71	0.61																														
35	1.21	1.11	1.01	0.91	0.81	0.71	0.61																															
40	1.11	1.01	0.91	0.81	0.71	0.61																																
45	1.01	0.91	0.81	0.71	0.61																																	
50	0.91	0.81	0.71	0.61																																		
60	0.81	0.71	0.61																																			
70	0.71	0.61																																				
80	0.61																																					

Value of $D = t/S_p$

Single-sided test $\alpha = .025$
Double-sided test $\alpha = .05$

[illegible]

Value of $D = \delta/S_p$

TABLE 13

Single-sided test $\alpha = .025$ $\beta = .10$
 Double-sided test $\alpha = .05$

	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	35	40	45	50	60	70	80
1	6.19	4.60	3.79	3.39	3.17	3.09	2.99	2.89	2.79	2.70	2.67	2.64	2.61	2.59	2.57	2.56	2.54	2.53	2.52	2.51	2.50	2.49	2.48	2.47	2.46	2.45	2.44	2.43	2.42	2.41	2.40	2.38	2.37	2.36	2.35	
2	4.60	3.52	3.09	2.84	2.67	2.56	2.47	2.40	2.35	2.30	2.27	2.24	2.21	2.19	2.17	2.15	2.13	2.12	2.10	2.09	2.08	2.07	2.06	2.05	2.04	2.03	2.02	2.01	1.99	1.98	1.97	1.95	1.94	1.93		
3	3.79	3.09	2.75	2.54	2.39	2.28	2.20	2.14	2.09	2.05	2.01	1.99	1.96	1.94	1.92	1.90	1.89	1.87	1.86	1.85	1.84	1.83	1.82	1.81	1.80	1.79	1.78	1.77	1.76	1.75	1.74	1.73	1.72	1.70	1.69	
4	3.39	2.84	2.54	2.34	2.21	2.11	2.03	1.97	1.92	1.88	1.85	1.83	1.82	1.79	1.77	1.75	1.74	1.72	1.71	1.69	1.68	1.67	1.66	1.65	1.64	1.63	1.62	1.61	1.60	1.59	1.58	1.57	1.55	1.53		
5	3.17	2.67	2.39	2.21	2.08	1.98	1.91	1.85	1.80	1.76	1.73	1.70	1.67	1.65	1.63	1.62	1.60	1.59	1.57	1.56	1.55	1.54	1.53	1.52	1.51	1.50	1.49	1.48	1.47	1.46	1.44	1.43	1.41	1.40		
6	2.99	2.56	2.28	2.11	1.98	1.89	1.82	1.76	1.71	1.67	1.64	1.61	1.58	1.56	1.54	1.53	1.51	1.50	1.48	1.47	1.46	1.45	1.44	1.43	1.42	1.41	1.40	1.39	1.38	1.36	1.34	1.33	1.32	1.30		
7	2.89	2.47	2.20	2.03	1.91	1.83	1.76	1.69	1.64	1.60	1.57	1.54	1.51	1.49	1.47	1.45	1.44	1.42	1.41	1.40	1.39	1.38	1.37	1.36	1.35	1.34	1.33	1.32	1.31	1.29	1.28	1.27	1.26	1.25		
8	2.84	2.40	2.14	1.97	1.85	1.76	1.69	1.63	1.58	1.54	1.51	1.48	1.45	1.43	1.41	1.39	1.38	1.36	1.35	1.34	1.33	1.32	1.31	1.30	1.29	1.28	1.27	1.26	1.25	1.24	1.23	1.22	1.21	1.20		
9	2.79	2.35	2.10	1.92	1.80	1.71	1.64	1.58	1.53	1.49	1.46	1.43	1.40	1.37	1.34	1.32	1.30	1.29	1.27	1.26	1.25	1.24	1.23	1.22	1.21	1.20	1.19	1.18	1.17	1.16	1.15	1.14	1.13	1.12		
10	2.74	2.30	2.05	1.87	1.75	1.66	1.59	1.53	1.48	1.44	1.41	1.38	1.35	1.33	1.31	1.29	1.27	1.25	1.24	1.22	1.21	1.20	1.19	1.18	1.17	1.16	1.15	1.14	1.13	1.12	1.11	1.10	1.09	1.08		
11	2.70	2.27	2.02	1.84	1.72	1.64	1.57	1.51	1.46	1.42	1.39	1.36	1.33	1.31	1.29	1.27	1.25	1.24	1.22	1.21	1.20	1.19	1.18	1.17	1.16	1.15	1.14	1.13	1.12	1.11	1.10	1.09	1.08	1.07		
12	2.67	2.24	1.99	1.82	1.70	1.61	1.54	1.48	1.43	1.39	1.36	1.33	1.31	1.29	1.27	1.25	1.24	1.22	1.21	1.20	1.19	1.18	1.17	1.16	1.15	1.14	1.13	1.12	1.11	1.10	1.09	1.08	1.07	1.06		
13	2.64	2.21	1.96	1.79	1.67	1.58	1.51	1.45	1.41	1.37	1.33	1.30	1.27	1.25	1.23	1.21	1.19	1.18	1.17	1.16	1.15	1.14	1.13	1.12	1.11	1.10	1.09	1.08	1.07	1.06	1.05	1.04	1.03	1.02		
14	2.61	2.19	1.94	1.77	1.65	1.56	1.49	1.43	1.38	1.34	1.31	1.28	1.25	1.23	1.21	1.19	1.18	1.17	1.16	1.15	1.14	1.13	1.12	1.11	1.10	1.09	1.08	1.07	1.06	1.05	1.04	1.03	1.02	1.01		
15	2.59	2.17	1.92	1.75	1.63	1.54	1.47	1.41	1.36	1.32	1.29	1.26	1.23	1.21	1.19	1.17	1.15	1.14	1.13	1.12	1.11	1.10	1.09	1.08	1.07	1.06	1.05	1.04	1.03	1.02	1.01	1.00	0.99	0.98		
16	2.57	2.15	1.90	1.73	1.61	1.52	1.45	1.39	1.35	1.30	1.27	1.24	1.21	1.19	1.17	1.15	1.13	1.12	1.10	1.09	1.08	1.07	1.06	1.05	1.04	1.03	1.02	1.01	1.00	0.99	0.98	0.97	0.96	0.95		
17	2.56	2.13	1.88	1.71	1.59	1.50	1.43	1.37	1.33	1.28	1.25	1.22	1.19	1.17	1.15	1.13	1.12	1.10	1.09	1.08	1.07	1.06	1.05	1.04	1.03	1.02	1.01	1.00	0.99	0.98	0.97	0.96	0.95	0.94		
18	2.54	2.12	1.87	1.70	1.58	1.49	1.42	1.36	1.32	1.27	1.24	1.21	1.18	1.16	1.14	1.12	1.10	1.09	1.08	1.07	1.06	1.05	1.04	1.03	1.02	1.01	1.00	0.99	0.98	0.97	0.96	0.95	0.94	0.93		
19	2.53	2.11	1.86	1.69	1.57	1.48	1.41	1.35	1.30	1.26	1.22	1.19	1.17	1.15	1.13	1.11	1.10	1.09	1.08	1.07	1.06	1.05	1.04	1.03	1.02	1.01	1.00	0.99	0.98	0.97	0.96	0.95	0.94	0.93		
20	2.52	2.10	1.85	1.68	1.56	1.47	1.40	1.34	1.29	1.25	1.21	1.18	1.16	1.14	1.12	1.10	1.09	1.08	1.07	1.06	1.05	1.04	1.03	1.02	1.01	1.00	0.99	0.98	0.97	0.96	0.95	0.94	0.93	0.92		
21	2.51	2.09	1.84	1.67	1.55	1.46	1.39	1.33	1.28	1.24	1.20	1.17	1.15	1.13	1.11	1.09	1.08	1.07	1.06	1.05	1.04	1.03	1.02	1.01	1.00	0.99	0.98	0.97	0.96	0.95	0.94	0.93	0.92	0.91		
22	2.50	2.08	1.83	1.66	1.54	1.45	1.38	1.32	1.27	1.23	1.19	1.16	1.14	1.12	1.10	1.09	1.08	1.07	1.06	1.05	1.04	1.03	1.02	1.01	1.00	0.99	0.98	0.97	0.96	0.95	0.94	0.93	0.92	0.91		
23	2.49	2.07	1.82	1.65	1.53	1.44	1.37	1.31	1.26	1.22	1.18	1.15	1.13	1.11	1.09	1.08	1.07	1.06	1.05	1.04	1.03	1.02	1.01	1.00	0.99	0.98	0.97	0.96	0.95	0.94	0.93	0.92	0.91	0.90		
24	2.48	2.06	1.81	1.64	1.52	1.43	1.36	1.30	1.25	1.21	1.17	1.14	1.11	1.09	1.07	1.06	1.05	1.04	1.03	1.02	1.01	1.00	0.99	0.98	0.97	0.96	0.95	0.94	0.93	0.92	0.91	0.90	0.89	0.88		
25	2.47	2.05	1.80	1.63	1.51	1.42	1.35	1.29	1.24	1.20	1.16	1.13	1.11	1.09	1.07	1.06	1.05	1.04	1.03	1.02	1.01	1.00	0.99	0.98	0.97	0.96	0.95	0.94	0.93	0.92	0.91	0.90	0.89	0.88		
26	2.47	2.05	1.80	1.63	1.51	1.42	1.35	1.29	1.24	1.20	1.16	1.13	1.11	1.09	1.07	1.06	1.05	1.04	1.03	1.02	1.01	1.00	0.99	0.98	0.97	0.96	0.95	0.94	0.93	0.92	0.91	0.90	0.89	0.88		
27	2.47	2.05	1.80	1.63	1.51	1.42	1.35	1.29	1.24	1.20	1.16	1.13	1.11	1.09	1.07	1.06	1.05	1.04	1.03	1.02	1.01	1.00	0.99	0.98	0.97	0.96	0.95	0.94	0.93	0.92	0.91	0.90	0.89	0.88		
28	2.46	2.04	1.79	1.62	1.50	1.41	1.34	1.28	1.23	1.19	1.15	1.12	1.10	1.08	1.06	1.05	1.04	1.03	1.02	1.01	1.00	0.99	0.98	0.97	0.96	0.95	0.94	0.93	0.92	0.91	0.90	0.89	0.88	0.87		
29	2.45	2.03	1.78	1.61	1.49	1.40	1.33	1.27	1.22	1.18	1.14	1.11	1.09	1.07	1.06	1.05	1.04	1.03	1.02	1.01	1.00	0.99	0.98	0.97	0.96	0.95	0.94	0.93	0.92	0.91	0.90	0.89	0.88	0.87		
30	2.45	2.03	1.78	1.61	1.49	1.40	1.33	1.27	1.22	1.18	1.14	1.11	1.09	1.07	1.06	1.05	1.04	1.03	1.02	1.01	1.00	0.99	0.98	0.97	0.96	0.95	0.94	0.93	0.92	0.91	0.90	0.89	0.88	0.87		
31	2.45	2.03	1.78	1.61	1.49	1.40	1.33	1.27	1.22	1.18	1.14	1.11	1.09	1.07	1.06	1.05	1.04	1.03	1.02	1.01	1.00	0.99	0.98	0.97	0.96	0.95	0.94	0.93	0.92	0.91	0.90	0.89	0.88	0.87		
32	2.45	2.03	1.78	1.61	1.49	1.40	1.33	1.27	1.22	1.18	1.14	1.11	1.09	1.07	1.06	1.05	1.04	1.03	1.02	1.01	1.00	0.99	0.98	0.97	0.96	0.95	0.94	0.93	0.92	0.91	0.90	0.89	0.88	0.87		
33	2.45	2.03	1.78	1.61	1.49	1.40	1.33	1.27	1.22	1.18	1.14	1.11	1.09	1.07	1.06	1.05	1.04	1.03	1.02	1.01	1.00	0.99	0.98	0.97	0.96	0.95	0.94	0.93	0.92	0.91	0.90	0.89	0.88	0.87		
34	2.45	2.03	1.78	1.61	1.49	1.40	1.33	1.27	1.22	1.18	1.14	1.11	1.09	1.07	1.06	1.05	1.04	1.03	1.02	1.01	1.00	0.99	0.98	0.97	0.96	0.95	0.94	0.93	0.92	0.91	0.90	0.89	0.88	0.87		
35	2.45	2.03	1.78	1.61	1.49	1.40	1.33	1.27	1.22	1.18	1.14	1.11	1.09	1.07	1.06	1.05	1.04	1.03	1.02	1.01	1.00	0.99	0.98	0.97	0.96	0.95	0.94	0.93	0.92	0.91	0.90	0.89	0.88	0.87		
36	2.45	2.03	1.78	1.61	1.49	1.40	1.33	1.27	1.22	1.18	1.14	1.11	1.09	1.07	1.06	1.05	1.04	1.03	1.02	1.01	1.00	0.99	0.98	0.97	0.96	0.95	0.94	0.93	0.92	0.91	0.90	0.89	0.88	0.87		
37	2.45	2.03	1.78	1.61	1.49	1.40	1.33	1.27	1.22	1.18	1.14	1.11	1.09	1.07	1.06	1.05	1.04	1.03	1.02	1.01	1.00	0.99	0.98	0.97	0.96	0.95	0.94	0.93	0.92	0.91	0.90	0.89	0.88	0.87		
38	2.45	2.03	1.78	1.61	1.49	1.40	1.33	1.27	1.22	1.18	1.14	1.11	1.09	1.07	1.06	1.05	1.04	1.03																		

Single-sided test $\alpha = .025$ $\beta = .20$
Double-sided test $\alpha = .05$

Double-sided test $\alpha = .05$																																						
	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	35	40	45	50	60	70	80		
2	5.96	3.80	3.22	2.92	2.74	2.61	2.53	2.46	2.41	2.37	2.33	2.30	2.28	2.26	2.24	2.22	2.21	2.20	2.18	2.17	2.17	2.16	2.15	2.14	2.14	2.13	2.12	2.12	2.11	2.10	2.08	2.07	2.06	2.05	2.04	2.03		
3	3.80	3.03	2.67	2.45	2.31	2.20	2.13	2.07	2.03	1.99	1.96	1.93	1.91	1.89	1.87	1.86	1.84	1.83	1.82	1.81	1.80	1.79	1.79	1.78	1.77	1.77	1.76	1.75	1.73	1.71	1.70	1.68	1.67	1.66	1.65	1.64		
4	3.22	2.67	2.37	2.19	2.06	1.97	1.90	1.85	1.81	1.77	1.74	1.71	1.69	1.67	1.66	1.64	1.63	1.62	1.61	1.60	1.59	1.58	1.57	1.57	1.56	1.55	1.55	1.54	1.52	1.51	1.49	1.48	1.47	1.46	1.45	1.44		
5	2.92	2.45	2.19	2.02	1.90	1.82	1.75	1.70	1.66	1.63	1.60	1.57	1.55	1.53	1.51	1.50	1.49	1.47	1.46	1.45	1.44	1.44	1.43	1.43	1.42	1.42	1.41	1.40	1.39	1.38	1.36	1.35	1.34	1.33	1.32	1.31		
6	2.74	2.31	2.06	1.90	1.79	1.71	1.65	1.60	1.56	1.52	1.49	1.47	1.45	1.43	1.41	1.40	1.38	1.37	1.36	1.35	1.34	1.33	1.33	1.32	1.32	1.31	1.31	1.30	1.30	1.27	1.26	1.24	1.23	1.22	1.21	1.20		
7	2.61	2.20	1.97	1.82	1.71	1.63	1.57	1.52	1.48	1.44	1.41	1.39	1.37	1.35	1.33	1.32	1.30	1.29	1.28	1.27	1.26	1.25	1.25	1.24	1.23	1.23	1.22	1.22	1.21	1.19	1.17	1.16	1.15	1.14	1.13	1.12		
8	2.53	2.13	1.90	1.75	1.65	1.57	1.51	1.46	1.42	1.38	1.35	1.33	1.31	1.29	1.27	1.25	1.24	1.23	1.22	1.21	1.20	1.19	1.18	1.18	1.17	1.17	1.16	1.16	1.15	1.13	1.12	1.11	1.10	1.09	1.07	1.06		
9	2.46	2.07	1.85	1.70	1.60	1.52	1.46	1.41	1.37	1.33	1.30	1.28	1.26	1.24	1.22	1.20	1.19	1.18	1.17	1.16	1.15	1.14	1.13	1.13	1.12	1.12	1.11	1.10	1.09	1.08	1.07	1.06	1.05	1.03	1.02	1.01		
10	2.41	2.03	1.81	1.66	1.56	1.48	1.42	1.37	1.33	1.29	1.26	1.24	1.21	1.19	1.18	1.16	1.15	1.14	1.13	1.12	1.11	1.10	1.10	1.09	1.08	1.08	1.07	1.06	1.05	1.03	1.02	1.00	0.99	0.97	0.96	0.95		
11	2.37	1.99	1.77	1.63	1.52	1.44	1.38	1.33	1.29	1.26	1.23	1.20	1.18	1.16	1.14	1.13	1.11	1.10	1.09	1.08	1.07	1.06	1.05	1.05	1.04	1.03	1.03	1.02	1.00	0.99	0.98	0.96	0.95	0.93	0.92	0.91		
12	2.33	1.96	1.74	1.60	1.49	1.41	1.35	1.30	1.26	1.23	1.20	1.17	1.15	1.13	1.11	1.10	1.08	1.07	1.06	1.05	1.04	1.03	1.02	1.01	1.01	1.00	0.99	0.98	0.96	0.95	0.94	0.92	0.91	0.90	0.89	0.88		
13	2.30	1.93	1.71	1.57	1.47	1.39	1.33	1.28	1.24	1.20	1.17	1.15	1.12	1.10	1.09	1.07	1.06	1.04	1.03	1.02	1.01	1.00	0.99	0.98	0.97	0.96	0.95	0.94	0.92	0.91	0.90	0.89	0.88	0.87	0.86	0.85		
14	2.28	1.91	1.69	1.55	1.45	1.37	1.31	1.26	1.22	1.18	1.15	1.12	1.10	1.08	1.06	1.05	1.03	1.02	1.01	1.00	0.99	0.98	0.97	0.96	0.95	0.94	0.93	0.92	0.90	0.89	0.88	0.87	0.86	0.85	0.84	0.83		
15	2.26	1.89	1.67	1.53	1.43	1.35	1.29	1.24	1.19	1.16	1.13	1.10	1.08	1.06	1.04	1.03	1.01	1.00	0.98	0.97	0.96	0.95	0.94	0.93	0.92	0.91	0.90	0.89	0.88	0.87	0.86	0.85	0.84	0.83	0.82	0.81		
16	2.24	1.87	1.66	1.51	1.41	1.33	1.27	1.22	1.18	1.14	1.11	1.09	1.06	1.04	1.02	1.01	0.99	0.98	0.97	0.95	0.94	0.93	0.92	0.91	0.90	0.89	0.88	0.87	0.86	0.85	0.84	0.83	0.82	0.81	0.80	0.79		
17	2.22	1.86	1.64	1.50	1.40	1.32	1.25	1.20	1.16	1.12	1.10	1.07	1.06	1.04	1.02	1.01	0.98	0.97	0.95	0.94	0.92	0.91	0.90	0.89	0.88	0.87	0.86	0.85	0.84	0.83	0.82	0.81	0.80	0.79	0.78	0.77		
18	2.21	1.84	1.63	1.49	1.39	1.30	1.24	1.19	1.15	1.11	1.08	1.06	1.04	1.02	1.00	0.98	0.97	0.95	0.94	0.92	0.91	0.90	0.89	0.88	0.87	0.86	0.85	0.84	0.83	0.82	0.81	0.80	0.79	0.78	0.77	0.76		
19	2.20	1.83	1.62	1.47	1.37	1.29	1.23	1.18	1.14	1.10	1.07	1.04	1.02	1.00	0.98	0.97	0.95	0.94	0.92	0.91	0.90	0.89	0.88	0.87	0.86	0.85	0.84	0.83	0.82	0.81	0.80	0.79	0.78	0.77	0.76	0.75		
20	2.19	1.82	1.61	1.46	1.36	1.28	1.22	1.17	1.13	1.09	1.06	1.03	1.01	0.99	0.97	0.95	0.94	0.92	0.91	0.90	0.89	0.88	0.87	0.86	0.85	0.84	0.83	0.82	0.81	0.80	0.79	0.78	0.77	0.76	0.75	0.74		
21	2.17	1.81	1.60	1.45	1.35	1.27	1.21	1.16	1.11	1.08	1.05	1.02	1.00	0.98	0.96	0.94	0.93	0.91	0.90	0.89	0.88	0.87	0.86	0.85	0.84	0.83	0.82	0.81	0.80	0.79	0.78	0.77	0.76	0.75	0.74	0.73		
22	2.17	1.80	1.59	1.44	1.34	1.26	1.20	1.15	1.10	1.07	1.04	1.01	0.99	0.97	0.95	0.93	0.92	0.90	0.89	0.88	0.87	0.86	0.85	0.84	0.83	0.82	0.81	0.80	0.79	0.78	0.77	0.76	0.75	0.74	0.73	0.72		
23	2.16	1.79	1.58	1.43	1.33	1.25	1.19	1.14	1.10	1.06	1.03	1.00	0.98	0.96	0.94	0.92	0.91	0.89	0.88	0.87	0.86	0.85	0.84	0.83	0.82	0.81	0.80	0.79	0.78	0.77	0.76	0.75	0.74	0.73	0.72	0.71		
24	2.15	1.79	1.57	1.43	1.33	1.25	1.18	1.13	1.09	1.05	1.02	0.99	0.97	0.95	0.93	0.91	0.90	0.88	0.87	0.86	0.85	0.84	0.83	0.82	0.81	0.80	0.79	0.78	0.77	0.76	0.75	0.74	0.73	0.72	0.71	0.70		
25	2.14	1.78	1.57	1.42	1.32	1.24	1.18	1.13	1.08	1.05	1.01	0.99	0.96	0.94	0.92	0.90	0.89	0.87	0.86	0.85	0.84	0.83	0.82	0.81	0.80	0.79	0.78	0.77	0.76	0.75	0.74	0.73	0.72	0.71	0.70	0.69		
26	2.14	1.77	1.56	1.42	1.31	1.23	1.17	1.12	1.08	1.04	1.01	0.98	0.96	0.93	0.91	0.90	0.88	0.87	0.85	0.84	0.83	0.82	0.81	0.80	0.79	0.78	0.77	0.76	0.75	0.74	0.73	0.72	0.71	0.70	0.69	0.68		
27	2.13	1.77	1.55	1.41	1.31	1.23	1.17	1.11	1.07	1.03	1.00	0.97	0.95	0.92	0.91	0.89	0.87	0.86	0.84	0.83	0.82	0.81	0.80	0.79	0.78	0.77	0.76	0.75	0.74	0.73	0.72	0.71	0.70	0.69	0.68	0.67		
28	2.12	1.76	1.55	1.41	1.30	1.22	1.16	1.10	1.06	1.03	0.99	0.97	0.94	0.92	0.90	0.88	0.87	0.85	0.84	0.83	0.82	0.81	0.80	0.79	0.78	0.77	0.76	0.75	0.74	0.73	0.72	0.71	0.70	0.69	0.68	0.67		
29	2.12	1.76	1.54	1.40	1.30	1.22	1.15	1.10	1.06	1.02	0.99	0.97	0.94	0.92	0.90	0.88	0.87	0.85	0.84	0.83	0.82	0.81	0.80	0.79	0.78	0.77	0.76	0.75	0.74	0.73	0.72	0.71	0.70	0.69	0.68	0.67		
30	2.11	1.75	1.54	1.40	1.30	1.21	1.15	1.10	1.05	1.02	0.98	0.95	0.93	0.91	0.89	0.87	0.85	0.84	0.83	0.82	0.81	0.80	0.79	0.78	0.77	0.76	0.75	0.74	0.73	0.72	0.71	0.70	0.69	0.68	0.67			
35	2.10	1.73	1.52	1.38	1.27	1.19	1.13	1.07	1.03	0.99	0.96	0.93	0.91	0.89	0.86	0.84	0.83	0.81	0.80	0.79	0.78	0.77	0.76	0.75	0.74	0.73	0.72	0.71	0.70	0.69	0.68	0.67	0.66	0.65	0.64			
40	2.08	1.72	1.51	1.36	1.26	1.17	1.11	1.06	1.01	0.98	0.94	0.91	0.89	0.86	0.83	0.81	0.79	0.78	0.77	0.75	0.74	0.73	0.72	0.71	0.70	0.69	0.68	0.67	0.66	0.65	0.64	0.63	0.62	0.61	0.60			
45	2.07	1.71	1.49	1.35	1.24	1.16	1.10	1.04	1.00	0.96	0.93	0.90	0.87	0.83	0.81	0.79	0.78	0.77	0.75	0.74	0.73	0.72	0.71	0.70	0.69	0.68	0.67	0.66	0.65	0.64	0.63	0.62	0.61	0.60	0.59			
50	2.06	1.70	1.48	1.34	1.23	1.15	1.09	1.03	0.99	0.95	0.92	0.89	0.86	0.82	0.80	0.78	0.77	0.75	0.74	0.73	0.72	0.71	0.70	0.69	0.68	0.67	0.66	0.65	0.64	0.63	0.62	0.61	0.60	0.59	0.58			
60	2.05	1.68	1.47	1.33	1.22	1.14	1.07	1.02	0.97	0.93	0.90	0.87	0.84	0.82	0.80	0.78	0.77	0.75	0.74	0.73	0.72	0.71	0.70	0.69	0.68	0.67	0.66	0.65	0.64	0.63	0.62	0.61	0.60	0.59	0.58			
70	2.04	1.68	1.46	1.32	1.21	1.13	1.06	1.01	0.96	0.92	0.89	0.86	0.83	0.81	0.79	0.77	0.75	0.73	0.72	0.71	0.69	0.68	0.67	0.66	0.65	0.64	0.63	0.62	0.61	0.60	0.59	0.58	0.57	0.56	0.55			
80	2.03	1.67	1.45	1.31	1.20	1.12	1.05	1.00	0.95	0.91	0.88	0.85	0.82	0.80	0.78	0.76	0.74	0.72	0.71	0.69	0.68	0.67	0.66	0.65	0.64	0.63	0.62	0.61	0.60	0.59	0.58	0.57	0.56	0.55	0.54			

Value of $D = \delta/S_p$

NOT REPRODUCIBLE

TABLE 15

Single-sided test $\alpha = .025$
Double-sided test $\alpha = .05$

[illegible]

TABLE 16

Single-sided test $\alpha = .05$ $\rho = .01$
 Double sided test $\alpha = .10$

	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
1	9.00	6.29	5.09	4.50	4.15	3.90	3.76	3.64	3.54	3.47	3.40	3.34	3.28	3.23	3.17	3.13	3.08	3.04	3.00	2.96	2.92	2.88	2.85	2.82	2.79	2.76	2.73	2.70	2.67	2.64	2.61	2.58	2.55	2.52	2.49	2.46	2.43	2.40	2.37	2.34	2.31	2.28	2.25	2.22	2.19	2.16	2.13	2.10	2.07	2.04	2.01	1.98	1.95	1.92	1.89	1.86	1.83	1.80	1.77	1.74	1.71	1.68	1.65	1.62	1.59	1.56	1.53	1.50	1.47	1.44	1.41	1.38	1.35	1.32	1.29	1.26	1.23	1.20	1.17	1.14	1.11	1.08	1.05	1.02	0.99	0.96	0.93	0.90	0.87	0.84	0.81	0.78	0.75	0.72	0.69	0.66	0.63	0.60	0.57	0.54	0.51	0.48	0.45	0.42	0.39	0.36	0.33	0.30	0.27	0.24	0.21	0.18	0.15	0.12	0.09	0.06	0.03	0.00	-0.03	-0.06	-0.09	-0.12	-0.15	-0.18	-0.21	-0.24	-0.27	-0.30	-0.33	-0.36	-0.39	-0.42	-0.45	-0.48	-0.51	-0.54	-0.57	-0.60	-0.63	-0.66	-0.69	-0.72	-0.75	-0.78	-0.81	-0.84	-0.87	-0.90	-0.93	-0.96	-0.99	-1.02	-1.05	-1.08	-1.11	-1.14	-1.17	-1.20	-1.23	-1.26	-1.29	-1.32	-1.35	-1.38	-1.41	-1.44	-1.47	-1.50	-1.53	-1.56	-1.59	-1.62	-1.65	-1.68	-1.71	-1.74	-1.77	-1.80	-1.83	-1.86	-1.89	-1.92	-1.95	-1.98	-2.01	-2.04	-2.07	-2.10	-2.13	-2.16	-2.19	-2.22	-2.25	-2.28	-2.31	-2.34	-2.37	-2.40	-2.43	-2.46	-2.49	-2.52	-2.55	-2.58	-2.61	-2.64	-2.67	-2.70	-2.73	-2.76	-2.79	-2.82	-2.85	-2.88	-2.91	-2.94	-2.97	-3.00	-3.03	-3.06	-3.09	-3.12	-3.15	-3.18	-3.21	-3.24	-3.27	-3.30	-3.33	-3.36	-3.39	-3.42	-3.45	-3.48	-3.51	-3.54	-3.57	-3.60	-3.63	-3.66	-3.69	-3.72	-3.75	-3.78	-3.81	-3.84	-3.87	-3.90	-3.93	-3.96	-3.99	-4.02	-4.05	-4.08	-4.11	-4.14	-4.17	-4.20	-4.23	-4.26	-4.29	-4.32	-4.35	-4.38	-4.41	-4.44	-4.47	-4.50	-4.53	-4.56	-4.59	-4.62	-4.65	-4.68	-4.71	-4.74	-4.77	-4.80	-4.83	-4.86	-4.89	-4.92	-4.95	-4.98	-5.01	-5.04	-5.07	-5.10	-5.13	-5.16	-5.19	-5.22	-5.25	-5.28	-5.31	-5.34	-5.37	-5.40	-5.43	-5.46	-5.49	-5.52	-5.55	-5.58	-5.61	-5.64	-5.67	-5.70	-5.73	-5.76	-5.79	-5.82	-5.85	-5.88	-5.91	-5.94	-5.97	-6.00	-6.03	-6.06	-6.09	-6.12	-6.15	-6.18	-6.21	-6.24	-6.27	-6.30	-6.33	-6.36	-6.39	-6.42	-6.45	-6.48	-6.51	-6.54	-6.57	-6.60	-6.63	-6.66	-6.69	-6.72	-6.75	-6.78	-6.81	-6.84	-6.87	-6.90	-6.93	-6.96	-6.99	-7.02	-7.05	-7.08	-7.11	-7.14	-7.17	-7.20	-7.23	-7.26	-7.29	-7.32	-7.35	-7.38	-7.41	-7.44	-7.47	-7.50	-7.53	-7.56	-7.59	-7.62	-7.65	-7.68	-7.71	-7.74	-7.77	-7.80	-7.83	-7.86	-7.89	-7.92	-7.95	-7.98	-8.01	-8.04	-8.07	-8.10	-8.13	-8.16	-8.19	-8.22	-8.25	-8.28	-8.31	-8.34	-8.37	-8.40	-8.43	-8.46	-8.49	-8.52	-8.55	-8.58	-8.61	-8.64	-8.67	-8.70	-8.73	-8.76	-8.79	-8.82	-8.85	-8.88	-8.91	-8.94	-8.97	-9.00	-9.03	-9.06	-9.09	-9.12	-9.15	-9.18	-9.21	-9.24	-9.27	-9.30	-9.33	-9.36	-9.39	-9.42	-9.45	-9.48	-9.51	-9.54	-9.57	-9.60	-9.63	-9.66	-9.69	-9.72	-9.75	-9.78	-9.81	-9.84	-9.87	-9.90	-9.93	-9.96	-9.99	-10.02	-10.05	-10.08	-10.11	-10.14	-10.17	-10.20	-10.23	-10.26	-10.29	-10.32	-10.35	-10.38	-10.41	-10.44	-10.47	-10.50	-10.53	-10.56	-10.59	-10.62	-10.65	-10.68	-10.71	-10.74	-10.77	-10.80	-10.83	-10.86	-10.89	-10.92	-10.95	-10.98	-11.01	-11.04	-11.07	-11.10	-11.13	-11.16	-11.19	-11.22	-11.25	-11.28	-11.31	-11.34	-11.37	-11.40	-11.43	-11.46	-11.49	-11.52	-11.55	-11.58	-11.61	-11.64	-11.67	-11.70	-11.73	-11.76	-11.79	-11.82	-11.85	-11.88	-11.91	-11.94	-11.97	-12.00	-12.03	-12.06	-12.09	-12.12	-12.15	-12.18	-12.21	-12.24	-12.27	-12.30	-12.33	-12.36	-12.39	-12.42	-12.45	-12.48	-12.51	-12.54	-12.57	-12.60	-12.63	-12.66	-12.69	-12.72	-12.75	-12.78	-12.81	-12.84	-12.87	-12.90	-12.93	-12.96	-12.99	-13.02	-13.05	-13.08	-13.11	-13.14	-13.17	-13.20	-13.23	-13.26	-13.29	-13.32	-13.35	-13.38	-13.41	-13.44	-13.47	-13.50	-13.53	-13.56	-13.59	-13.62	-13.65	-13.68	-13.71	-13.74	-13.77	-13.80	-13.83	-13.86	-13.89	-13.92	-13.95	-13.98	-14.01	-14.04	-14.07	-14.10	-14.13	-14.16	-14.19	-14.22	-14.25	-14.28	-14.31	-14.34	-14.37	-14.40	-14.43	-14.46	-14.49	-14.52	-14.55	-14.58	-14.61	-14.64	-14.67	-14.70	-14.73	-14.76	-14.79	-14.82	-14.85	-14.88	-14.91	-14.94	-14.97	-15.00	-15.03	-15.06	-15.09	-15.12	-15.15	-15.18	-15.21	-15.24	-15.27	-15.30	-15.33	-15.36	-15.39	-15.42	-15.45	-15.48	-15.51	-15.54	-15.57	-15.60	-15.63	-15.66	-15.69	-15.72	-15.75	-15.78	-15.81	-15.84	-15.87	-15.90	-15.93	-15.96	-15.99	-16.02	-16.05	-16.08	-16.11	-16.14	-16.17	-16.20	-16.23	-16.26	-16.29	-16.32	-16.35	-16.38	-16.41	-16.44	-16.47	-16.50	-16.53	-16.56	-16.59	-16.62	-16.65	-16.68	-16.71	-16.74	-16.77	-16.80	-16.83	-16.86	-16.89	-16.92	-16.95	-16.98	-17.01	-17.04	-17.07	-17.10	-17.13	-17.16	-17.19	-17.22	-17.25	-17.28	-17.31	-17.34	-17.37	-17.40	-17.43	-17.46	-17.49	-17.52	-17.55	-17.58	-17.61	-17.64	-17.67	-17.70	-17.73	-17.76	-17.79	-17.82	-17.85	-17.88	-17.91	-17.94	-17.97	-18.00	-18.03	-18.06	-18.09	-18.12	-18.15	-18.18	-18.21	-18.24	-18.27	-18.30	-18.33	-18.36	-18.39	-18.42	-18.45	-18.48	-18.51	-18.54	-18.57	-18.60	-18.63	-18.66	-18.69	-18.72	-18.75	-18.78	-18.81	-18.84	-18.87	-18.90	-18.93	-18.96	-18.99	-19.02	-19.05	-19.08	-19.11	-19.14	-19.17	-19.20	-19.23	-19.26	-19.29	-19.32	-19.35	-19.38	-19.41	-19.44	-19.47	-19.50	-19.53	-19.56	-19.59	-19.62	-19.65	-19.68	-19.71	-19.74	-19.77	-19.80	-19.83	-19.86	-19.89	-19.92	-19.95	-19.98	-20.01	-20.04	-20.07	-20.10	-20.13	-20.16	-20.19	-20.22	-20.25	-20.28	-20.31	-20.34	-20.37	-20.40	-20.43	-20.46	-20.49	-20.52	-20.55	-20.58	-20.61	-20.64	-20.67	-20.70	-20.73	-20.76	-20.79	-20.82	-20.85	-20.88	-20.91	-20.94	-20.97	-21.00	-21.03	-21.06	-21.09	-21.12	-21.15	-21.18	-21.21	-21.24	-21.27	-21.30	-21.33	-21.36	-21.39	-21.42	-21.45	-21.48	-21.51	-21.54	-21.57	-21.60	-21.63	-21.66	-21.69	-21.72	-21.75	-21.78	-21.81	-21.84	-21.87	-21.90	-21.93	-21.96	-21.99	-22.02	-22.05	-22.08	-22.11	-22.14	-22.17	-22.20	-22.23	-22.26	-22.29	-22.32	-22.35	-22.38	-22.41	-22.44	-22.47	-22.50	-22.53	-22.56	-22.59	-22.62	-22.65	-22.68	-22.71	-22.74	-22.77	-22.80	-22.83	-22.86	-22.89	-22.92	-22.95	-22.98	-23.01	-23.04	-23.07	-23.10	-23.13	-23.16	-23.19	-23.22	-23.25	-23.28	-23.31	-23.34	-23.37	-23.40	-23.43	-23.46	-23.49	-23.52	-23.55	-23.58	-23.61	-23.64	-23.67	-23.70	-23.73	-23.76	-23.79	-23.82	-23.85	-23.88	-23.91	-23.94	-23.97	-24.00	-24.03	-24.06	-24.09	-24.12	-24.15	-24.18	-24.21	-24.24	-24.27	-24.30	-24.33	-24.36	-24.39	-24.42	-24.45	-24.48	-24.51	-24.54	-24.57	-24.60	-24.63	-24.66	-24.69	-24.72	-24.75	-24.78	-24.81	-24.84	-24.87	-24.90	-24.93	-24.96	-24.99	-25.02	-25.05	-25.08	-25.11	-25.14	-25.17	-25.20	-25.23	-25.26	-25.29	-25.32	-25.35	-25.38	-25.41	-25.44	-25.47	-25.50	-25.53	-25.56	-25.59	-25.62	-25.65	-25.68	-25.71	-25.74	-25.77	-25.80	-25.83	-25.86	-25.89	-25.92	-25.95	-25.98	-26.01	-26.04	-26.07	-26.10	-26.13	-26.16	-26.19	-26.22	-26.25	-26.28	-26.31	-26.34	-26.37	-26.40	-26.43	-26.46	-26.49	-26.52	-26.55	-26.58	-26.61	-26.64	-26.67	-26.70	-26.73	-26.76	-26.79	-26.82	-26.85	-26.88	-26.91	-26.94	-26.97	-27.00	-27.03	-27.06	-27.09	-27.12	-27.15	-27.18	-27.21	-27.24	-27.27	-27.30	-27.33	-27.36	-27.39	-27.42	-27.45	-27.48	-27.51	-27.54	-27.57	-27.60	-27.63	-27.66	-27.69	-27.72	-27.75	-27.78	-27.81	-27.84	-27.87	-27.90	-27.93	-27.96	-27.99	-28.02	-28.05	-28.08	-28.11	-28.14	-28.17	-28.20	-28.23	-28.26	-28.29	-28.32	-28.35	-28.38	-28.41	-28.44	-28.47	-28.50	-28.53	-28.56	-28.59	-28.62	-28.65	-28.68	-28.71	-28.74	-28.77	-28.80	-28.83	-28.86	-28.89	-28.92	-28.95	-28.98	-29.01	-29.04	-29.07	-29.10	-29.13	-29.16	-29.19	-29.22	-29.25	-29.28	-29.31	-29.34	-29.37	-29.40	-29.43	-29.46	-29.49	-29.52	-29.55	-29.58	-29.61	-29.64	-29.67	-29.70	-29.73	-29.76	-29.79	-29.82	-29.85	-29.88	-29.91	-29.94	-29.97	-30.00	-30.03	-30.06	-30.09	-30.12	-30.15	-30.18	-30.21	-30.24	-30.27	-30.30	-30.33	-30.36	-30.39	-30.42	-30.45	-30.48	-30.51	-30.54	-30.57	-30.60	-30.63	-30.66	-30.69	-30.72	-30.75	-30.78	-30.81	-30.84	-30.87	-30.90	-30.93	-30.96	-30.99	-31.02	-31.05	-31.08	-31.11	-31.14	-31.17	-31.20	-31.23	-31.26	-31.29	-31.32	-31.35	-31.38	-31.41	-31.44	-31.47	-31.50	-31.53	-31.56	-31.59	-31.62	-31.65	-31.68	-31.71	-31.74	-31.77	-31.80	-31.83	-31.86	-31.89	-31.92	-31.95	-31.98	-32.01	-32.04	-32.07	-32.10	-32.13	-32.16	-32.19	-32.22	-32.25	-32.28	-32.31	-32.34	-32.37	-32.40	-32.43	-32.46	-32.49	-32.52	-32.55	-32.58	-32.61	-32.64	-32.67	-32.70	-32.73	-32.76	-32.79	-32.82	-32.85	-32.88	-32.91	-32.94	-32.97	-33.00	-33.03	-33.06	-33.09	-33.12	-33.15	-33.18	-33.21	-33.24	-33.27	-33.30	-33.33	-33.36	-33.39	-33.42	-33.45	-33.48	-33.51	-33.54	-33.57	-33.60	-33.63	-33.66	-33.69</

TABLE 17

Single-sided test $\alpha = .05$
Double-sided test $\alpha = .10$

	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	35	40	45	50	60	70	80		
2	5.84	4.30	3.49	3.17	3.04	2.94	2.87	2.81	2.76	2.72	2.69	2.66	2.64	2.62	2.60	2.58	2.57	2.56	2.55	2.54	2.53	2.52	2.51	2.50	2.49	2.48	2.47	2.46	2.45	2.44	2.43	2.42	2.41	2.40	2.39	2.38		
3	4.30	3.17	2.68	2.48	2.37	2.30	2.24	2.20	2.16	2.13	2.10	2.08	2.06	2.04	2.02	2.00	1.99	1.98	1.97	1.96	1.95	1.94	1.93	1.92	1.91	1.90	1.89	1.88	1.87	1.86	1.85	1.84	1.83	1.82	1.81	1.80		
4	3.49	2.68	2.30	2.12	2.00	1.92	1.86	1.81	1.77	1.74	1.71	1.69	1.67	1.65	1.63	1.61	1.60	1.59	1.58	1.57	1.56	1.55	1.54	1.53	1.52	1.51	1.50	1.49	1.48	1.47	1.46	1.45	1.44	1.43	1.42	1.41		
5	3.17	2.48	2.12	1.94	1.81	1.72	1.66	1.61	1.57	1.54	1.51	1.49	1.47	1.45	1.43	1.41	1.40	1.39	1.38	1.37	1.36	1.35	1.34	1.33	1.32	1.31	1.30	1.29	1.28	1.27	1.26	1.25	1.24	1.23	1.22	1.21		
6	2.94	2.30	2.00	1.82	1.70	1.61	1.55	1.50	1.46	1.43	1.40	1.38	1.36	1.34	1.32	1.30	1.29	1.28	1.27	1.26	1.25	1.24	1.23	1.22	1.21	1.20	1.19	1.18	1.17	1.16	1.15	1.14	1.13	1.12	1.11	1.10		
7	2.81	2.20	1.91	1.73	1.63	1.56	1.50	1.45	1.41	1.38	1.35	1.33	1.31	1.29	1.27	1.25	1.24	1.23	1.22	1.21	1.20	1.19	1.18	1.17	1.16	1.15	1.14	1.13	1.12	1.11	1.10	1.09	1.08	1.07	1.06	1.05		
8	2.69	2.10	1.83	1.65	1.55	1.48	1.42	1.37	1.33	1.30	1.27	1.25	1.23	1.21	1.19	1.17	1.16	1.15	1.14	1.13	1.12	1.11	1.10	1.09	1.08	1.07	1.06	1.05	1.04	1.03	1.02	1.01	1.00	0.99	0.98	0.97		
9	2.57	2.00	1.74	1.56	1.46	1.39	1.33	1.28	1.24	1.21	1.18	1.16	1.14	1.12	1.10	1.08	1.07	1.06	1.05	1.04	1.03	1.02	1.01	1.00	0.99	0.98	0.97	0.96	0.95	0.94	0.93	0.92	0.91	0.90	0.89	0.88		
10	2.46	1.91	1.66	1.48	1.38	1.31	1.25	1.20	1.16	1.13	1.10	1.08	1.06	1.04	1.02	1.00	0.99	0.98	0.97	0.96	0.95	0.94	0.93	0.92	0.91	0.90	0.89	0.88	0.87	0.86	0.85	0.84	0.83	0.82	0.81	0.80		
11	2.36	1.83	1.58	1.40	1.30	1.23	1.17	1.12	1.08	1.05	1.02	1.00	0.98	0.96	0.94	0.92	0.90	0.89	0.88	0.87	0.86	0.85	0.84	0.83	0.82	0.81	0.80	0.79	0.78	0.77	0.76	0.75	0.74	0.73	0.72	0.71		
12	2.27	1.75	1.50	1.32	1.22	1.15	1.09	1.04	1.00	0.97	0.94	0.92	0.90	0.88	0.86	0.84	0.82	0.80	0.79	0.78	0.77	0.76	0.75	0.74	0.73	0.72	0.71	0.70	0.69	0.68	0.67	0.66	0.65	0.64	0.63	0.62		
13	2.19	1.68	1.43	1.25	1.15	1.08	1.02	0.97	0.93	0.90	0.87	0.85	0.83	0.81	0.79	0.77	0.75	0.73	0.71	0.70	0.69	0.68	0.67	0.66	0.65	0.64	0.63	0.62	0.61	0.60	0.59	0.58	0.57	0.56	0.55	0.54		
14	2.12	1.61	1.36	1.18	1.08	1.01	0.95	0.90	0.86	0.83	0.80	0.78	0.76	0.74	0.72	0.70	0.68	0.66	0.64	0.62	0.60	0.58	0.56	0.54	0.52	0.50	0.48	0.46	0.44	0.42	0.40	0.38	0.36	0.34	0.32	0.30		
15	2.06	1.55	1.30	1.12	1.02	0.95	0.89	0.84	0.80	0.77	0.74	0.72	0.70	0.68	0.66	0.64	0.62	0.60	0.58	0.56	0.54	0.52	0.50	0.48	0.46	0.44	0.42	0.40	0.38	0.36	0.34	0.32	0.30	0.28	0.26	0.24		
16	2.00	1.49	1.24	1.06	0.96	0.89	0.83	0.78	0.74	0.71	0.68	0.66	0.64	0.62	0.60	0.58	0.56	0.54	0.52	0.50	0.48	0.46	0.44	0.42	0.40	0.38	0.36	0.34	0.32	0.30	0.28	0.26	0.24	0.22	0.20	0.18		
17	1.95	1.44	1.19	1.01	0.91	0.84	0.78	0.73	0.69	0.66	0.63	0.61	0.59	0.57	0.55	0.53	0.51	0.49	0.47	0.45	0.43	0.41	0.39	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19	0.17	0.15	0.13		
18	1.90	1.40	1.15	0.97	0.87	0.80	0.74	0.69	0.65	0.62	0.59	0.57	0.55	0.53	0.51	0.49	0.47	0.45	0.43	0.41	0.39	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19	0.17	0.15	0.13	0.11	0.09		
19	1.86	1.36	1.11	0.93	0.83	0.76	0.70	0.65	0.61	0.58	0.55	0.53	0.51	0.49	0.47	0.45	0.43	0.41	0.39	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19	0.17	0.15	0.13	0.11	0.09	0.07	0.05		
20	1.82	1.32	1.07	0.89	0.79	0.72	0.66	0.61	0.57	0.54	0.51	0.49	0.47	0.45	0.43	0.41	0.39	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19	0.17	0.15	0.13	0.11	0.09	0.07	0.05	0.03	0.01		
21	1.79	1.29	1.04	0.86	0.76	0.69	0.63	0.58	0.54	0.51	0.48	0.46	0.44	0.42	0.40	0.38	0.36	0.34	0.32	0.30	0.28	0.26	0.24	0.22	0.20	0.18	0.16	0.14	0.12	0.10	0.08	0.06	0.04	0.02	0.00	-0.02		
22	1.76	1.26	1.01	0.83	0.73	0.66	0.60	0.55	0.51	0.48	0.45	0.43	0.41	0.39	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19	0.17	0.15	0.13	0.11	0.09	0.07	0.05	0.03	0.01	-0.01	-0.03	-0.05		
23	1.73	1.23	0.98	0.80	0.70	0.63	0.57	0.52	0.48	0.45	0.42	0.40	0.38	0.36	0.34	0.32	0.30	0.28	0.26	0.24	0.22	0.20	0.18	0.16	0.14	0.12	0.10	0.08	0.06	0.04	0.02	0.00	-0.02	-0.04	-0.06	-0.08		
24	1.70	1.20	0.95	0.77	0.67	0.60	0.54	0.49	0.45	0.42	0.39	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19	0.17	0.15	0.13	0.11	0.09	0.07	0.05	0.03	0.01	-0.01	-0.03	-0.05	-0.07	-0.09	-0.11		
25	1.67	1.17	0.92	0.74	0.64	0.57	0.51	0.46	0.42	0.39	0.36	0.34	0.32	0.30	0.28	0.26	0.24	0.22	0.20	0.18	0.16	0.14	0.12	0.10	0.08	0.06	0.04	0.02	0.00	-0.02	-0.04	-0.06	-0.08	-0.10	-0.12	-0.14		
26	1.64	1.14	0.89	0.71	0.61	0.54	0.48	0.43	0.39	0.36	0.33	0.31	0.29	0.27	0.25	0.23	0.21	0.19	0.17	0.15	0.13	0.11	0.09	0.07	0.05	0.03	0.01	-0.01	-0.03	-0.05	-0.07	-0.09	-0.11	-0.13	-0.15	-0.17	-0.19	
27	1.61	1.11	0.86	0.68	0.58	0.51	0.45	0.40	0.36	0.33	0.30	0.28	0.26	0.24	0.22	0.20	0.18	0.16	0.14	0.12	0.10	0.08	0.06	0.04	0.02	0.00	-0.02	-0.04	-0.06	-0.08	-0.10	-0.12	-0.14	-0.16	-0.18	-0.20	-0.22	
28	1.58	1.08	0.83	0.65	0.55	0.48	0.42	0.37	0.33	0.30	0.27	0.25	0.23	0.21	0.19	0.17	0.15	0.13	0.11	0.09	0.07	0.05	0.03	0.01	-0.01	-0.03	-0.05	-0.07	-0.09	-0.11	-0.13	-0.15	-0.17	-0.19	-0.21	-0.23	-0.25	
29	1.55	1.05	0.80	0.62	0.52	0.45	0.39	0.34	0.30	0.27	0.24	0.22	0.20	0.18	0.16	0.14	0.12	0.10	0.08	0.06	0.04	0.02	0.00	-0.02	-0.04	-0.06	-0.08	-0.10	-0.12	-0.14	-0.16	-0.18	-0.20	-0.22	-0.24	-0.26	-0.28	
30	1.52	1.02	0.77	0.59	0.49	0.42	0.36	0.31	0.27	0.24	0.21	0.19	0.17	0.15	0.13	0.11	0.09	0.07	0.05	0.03	0.01	-0.01	-0.03	-0.05	-0.07	-0.09	-0.11	-0.13	-0.15	-0.17	-0.19	-0.21	-0.23	-0.25	-0.27	-0.29	-0.31	
35	1.40	0.90	0.65	0.47	0.37	0.30	0.24	0.19	0.15	0.12	0.09	0.07	0.05	0.03	0.01	-0.01	-0.03	-0.05	-0.07	-0.09	-0.11	-0.13	-0.15	-0.17	-0.19	-0.21	-0.23	-0.25	-0.27	-0.29	-0.31	-0.33	-0.35	-0.37	-0.39	-0.41	-0.43	
40	1.28	0.78	0.53	0.35	0.25	0.18	0.12	0.07	0.03	0.00	-0.02	-0.04	-0.06	-0.08	-0.10	-0.12	-0.14	-0.16	-0.18	-0.20	-0.22	-0.24	-0.26	-0.28	-0.30	-0.32	-0.34	-0.36	-0.38	-0.40	-0.42	-0.44	-0.46	-0.48	-0.50	-0.52	-0.54	
45	1.16	0.66	0.41	0.23	0.13	0.06	0.00	-0.04	-0.08	-0.12	-0.16	-0.20	-0.24	-0.28	-0.32	-0.36	-0.40	-0.44	-0.48	-0.52	-0.56	-0.60	-0.64	-0.68	-0.72	-0.76	-0.80	-0.84	-0.88	-0.92	-0.96	-1.00	-1.04	-1.08	-1.12	-1.16	-1.20	
50	1.04	0.54	0.29	0.11	0.01	-0.06	-0.10	-0.14	-0.18	-0.22	-0.26	-0.30	-0.34	-0.38	-0.42	-0.46	-0.50	-0.54	-0.58	-0.62	-0.66	-0.70	-0.74	-0.78	-0.82	-0.86	-0.90	-0.94	-0.98	-1.02	-1.06	-1.10	-1.14	-1.18	-1.22	-1.26	-1.30	
60	0.88	0.38	0.13	-0.05	-0.15	-0.20	-0.24	-0.28	-0.32	-0.36	-0.40	-0.44	-0.48	-0.52	-0.56	-0.60	-0.64	-0.68	-0.72	-0.76	-0.80	-0.84	-0.88	-0.92	-0.96	-1.00	-1.04	-1.08	-1.12	-1.16	-1.20	-1.24	-1.28	-1.32	-1.36	-1.40	-1.44	-1.48
70	0.72	0.22	-0.03	-0.21	-0.31	-0.36	-0.40	-0.44	-0.48	-0.52	-0.56	-0.60	-0.64	-0.68	-0.72	-0.76	-0.80	-0.84	-0.88	-0.92	-0.96	-1.00	-1.04	-1.08	-1.12	-1.16	-1.20	-1.24	-1.28	-1.32	-1.36	-1.40	-1.44	-1.48	-1.52	-1.56	-1.60	-1.64
80	0.56	0.06	-0.19	-0.37	-0.47	-0.52	-0.56	-0.60	-0.64	-0.6																												

TABLE 18

Single-sided test $\alpha = .05$ $\beta = .10$
 Double-sided test $\alpha = .10$

Double-sided test $\alpha = .10$																																					
	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	35	40	45	50	60	70	80	
2	4.81	3.64	3.17	2.82	2.56	2.36	2.18	2.02	1.87	1.74	1.62	1.51	1.40	1.30	1.20	1.10	1.00	.90	.80	.70	.60	.50	.40	.30	.20	.10	.05	.02	.01	.00	.00	.00	.00	.00	.00	.00	.00
3	3.64	2.89	2.67	2.47	2.34	2.25	2.18	2.12	2.06	2.00	1.94	1.88	1.82	1.76	1.70	1.64	1.58	1.52	1.46	1.40	1.34	1.28	1.22	1.16	1.10	1.04	.98	.92	.86	.80	.74	.68	.62	.56	.50	.44	
4	3.17	2.67	2.39	2.22	2.10	2.02	1.95	1.90	1.86	1.82	1.78	1.74	1.70	1.66	1.62	1.58	1.54	1.50	1.46	1.42	1.38	1.34	1.30	1.26	1.22	1.18	1.14	1.10	1.06	1.02	.98	.94	.90	.86	.82	.78	
5	2.82	2.47	2.22	2.06	1.95	1.86	1.80	1.75	1.71	1.68	1.65	1.62	1.60	1.58	1.56	1.54	1.52	1.50	1.48	1.46	1.44	1.42	1.40	1.38	1.36	1.34	1.32	1.30	1.28	1.26	1.24	1.22	1.20	1.18	1.16	1.14	
6	2.56	2.34	2.10	1.95	1.84	1.76	1.69	1.64	1.60	1.57	1.54	1.52	1.50	1.48	1.46	1.44	1.42	1.40	1.38	1.36	1.34	1.32	1.30	1.28	1.26	1.24	1.22	1.20	1.18	1.16	1.14	1.12	1.10	1.08	1.06	1.04	
7	2.40	2.25	2.09	1.96	1.86	1.78	1.69	1.62	1.57	1.52	1.48	1.44	1.40	1.36	1.32	1.28	1.24	1.20	1.16	1.12	1.08	1.04	1.00	.96	.92	.88	.84	.80	.76	.72	.68	.64	.60	.56	.52	.48	
8	2.25	2.18	2.00	1.89	1.80	1.69	1.62	1.55	1.50	1.46	1.42	1.40	1.37	1.35	1.33	1.32	1.30	1.28	1.26	1.24	1.22	1.20	1.18	1.16	1.14	1.12	1.10	1.08	1.06	1.04	1.02	.99	.96	.93	.90		
9	2.12	2.06	1.90	1.79	1.69	1.64	1.57	1.50	1.45	1.41	1.38	1.35	1.33	1.30	1.28	1.26	1.24	1.22	1.20	1.18	1.16	1.14	1.12	1.10	1.08	1.06	1.04	1.02	1.00	.98	.96	.94	.92	.90	.88		
10	2.00	1.94	1.80	1.71	1.60	1.52	1.44	1.37	1.30	1.25	1.21	1.18	1.16	1.14	1.12	1.10	1.08	1.06	1.04	1.02	1.00	.98	.96	.94	.92	.90	.88	.86	.84	.82	.80	.78	.76	.74	.72	.70	
11	1.87	1.82	1.68	1.59	1.49	1.41	1.33	1.26	1.20	1.15	1.11	1.08	1.06	1.04	1.02	1.00	.98	.96	.94	.92	.90	.88	.86	.84	.82	.80	.78	.76	.74	.72	.70	.68	.66	.64	.62	.60	
12	1.74	1.70	1.57	1.48	1.39	1.31	1.23	1.16	1.10	1.05	1.01	.98	.96	.94	.92	.90	.88	.86	.84	.82	.80	.78	.76	.74	.72	.70	.68	.66	.64	.62	.60	.58	.56	.54	.52	.50	
13	1.62	1.58	1.46	1.37	1.29	1.21	1.13	1.06	1.00	.95	.91	.88	.86	.84	.82	.80	.78	.76	.74	.72	.70	.68	.66	.64	.62	.60	.58	.56	.54	.52	.50	.48	.46	.44	.42	.40	
14	1.51	1.47	1.36	1.27	1.19	1.11	1.03	.96	.90	.85	.81	.78	.76	.74	.72	.70	.68	.66	.64	.62	.60	.58	.56	.54	.52	.50	.48	.46	.44	.42	.40	.38	.36	.34	.32	.30	
15	1.40	1.37	1.26	1.17	1.09	1.01	.93	.86	.80	.75	.71	.68	.66	.64	.62	.60	.58	.56	.54	.52	.50	.48	.46	.44	.42	.40	.38	.36	.34	.32	.30	.28	.26	.24	.22	.20	
16	1.30	1.27	1.16	1.07	1.00	.92	.84	.77	.71	.66	.62	.59	.57	.55	.53	.51	.49	.47	.45	.43	.41	.39	.37	.35	.33	.31	.29	.27	.25	.23	.21	.19	.17	.15	.13	.11	
17	1.20	1.17	1.06	0.97	.90	.82	.74	.67	.61	.56	.52	.49	.47	.45	.43	.41	.39	.37	.35	.33	.31	.29	.27	.25	.23	.21	.19	.17	.15	.13	.11	.09	.07	.05	.03	.01	
18	1.10	1.07	0.96	0.87	.80	.72	.64	.57	.51	.46	.42	.39	.37	.35	.33	.31	.29	.27	.25	.23	.21	.19	.17	.15	.13	.11	.09	.07	.05	.03	.01	.00	.00	.00	.00	.00	
19	1.00	0.97	0.86	0.77	.70	.62	.54	.47	.41	.36	.32	.29	.27	.25	.23	.21	.19	.17	.15	.13	.11	.09	.07	.05	.03	.01	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	
20	.90	.87	0.76	0.67	.60	.52	.44	.37	.31	.26	.22	.19	.17	.15	.13	.11	.09	.07	.05	.03	.01	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	
21	.80	.77	0.66	0.57	.50	.42	.34	.27	.21	.16	.12	.09	.07	.05	.03	.01	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	
22	.70	.67	0.56	0.47	.40	.32	.24	.17	.11	.06	.02	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	
23	.60	.57	0.46	0.37	.30	.22	.14	.07	.01	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	
24	.50	.47	0.36	0.27	.20	.12	.04	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	
25	.40	.37	0.26	0.17	.10	.02	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	
26	.30	.27	0.16	0.07	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	
27	.20	.17	0.06	0.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	
28	.10	.07	0.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	
29	.05	.03	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	
30	.02	.01	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	
35	.01	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	
40	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	
45	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	
50	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	
60	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	
70	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	
80	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	

Value of $D = \delta/S_p$

Single-sided test $\alpha = .05$ $\beta = .20$
Double-sided test $\alpha = .10$

		Double-sided test $\alpha = .10$																														Value of $D = \epsilon/S_p$					
		2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	35	40	45	50	60	70	80
1	3.08	3.04	2.64	2.46	2.33	2.24	2.17	2.12	2.08	2.05	2.02	2.01	1.99	1.97	1.96	1.95	1.93	1.93	1.92	1.91	1.90	1.90	1.89	1.88	1.87	1.87	1.87	1.87	1.86	1.85	1.84	1.83	1.82	1.81	1.80	1.80	1.80
2	3.04	2.51	2.24	2.08	1.97	1.90	1.84	1.79	1.76	1.73	1.70	1.68	1.67	1.65	1.64	1.63	1.62	1.61	1.60	1.59	1.58	1.58	1.57	1.57	1.56	1.56	1.55	1.55	1.54	1.53	1.52	1.51	1.50	1.49	1.48	1.48	1.48
3	2.66	2.24	2.08	1.87	1.77	1.70	1.65	1.61	1.57	1.54	1.52	1.50	1.48	1.46	1.45	1.44	1.43	1.42	1.41	1.40	1.39	1.38	1.37	1.37	1.36	1.36	1.35	1.34	1.33	1.32	1.31	1.30	1.29	1.28	1.27	1.26	
4	2.46	2.08	1.87	1.76	1.64	1.58	1.52	1.48	1.45	1.42	1.39	1.37	1.36	1.34	1.33	1.32	1.30	1.29	1.28	1.27	1.26	1.26	1.25	1.25	1.24	1.24	1.23	1.22	1.21	1.20	1.19	1.18	1.17	1.16	1.15	1.14	
5	2.33	1.97	1.77	1.64	1.55	1.49	1.43	1.39	1.36	1.33	1.31	1.28	1.27	1.25	1.24	1.23	1.21	1.20	1.20	1.19	1.18	1.17	1.16	1.16	1.15	1.15	1.14	1.14	1.13	1.12	1.11	1.10	1.09	1.08	1.07	1.06	
6	2.24	1.90	1.70	1.58	1.49	1.43	1.37	1.32	1.29	1.26	1.24	1.22	1.20	1.18	1.17	1.16	1.15	1.14	1.13	1.12	1.11	1.10	1.10	1.09	1.09	1.08	1.08	1.07	1.07	1.06	1.05	1.04	1.03	1.02	1.01	1.00	0.99
7	2.17	1.84	1.65	1.52	1.43	1.37	1.31	1.27	1.24	1.21	1.18	1.15	1.13	1.12	1.10	1.09	1.08	1.07	1.06	1.05	1.04	1.03	1.02	1.00	0.99	0.99	0.98	0.97	0.97	0.96	0.95	0.94	0.93	0.92	0.91	0.90	0.89
8	2.12	1.79	1.61	1.48	1.39	1.32	1.27	1.23	1.20	1.17	1.14	1.12	1.10	1.09	1.07	1.06	1.05	1.04	1.03	1.02	1.01	1.00	0.99	0.97	0.96	0.95	0.94	0.94	0.93	0.91	0.89	0.88	0.87	0.86	0.85	0.84	0.83
9	2.08	1.76	1.57	1.45	1.36	1.29	1.24	1.20	1.16	1.13	1.10	1.08	1.06	1.04	1.02	1.00	0.99	0.98	0.97	0.96	0.95	0.94	0.93	0.92	0.91	0.90	0.89	0.88	0.87	0.86	0.85	0.84	0.83	0.82	0.81	0.80	0.79
10	2.05	1.73	1.54	1.42	1.33	1.26	1.21	1.17	1.13	1.10	1.08	1.05	1.04	1.02	1.00	0.99	0.98	0.96	0.95	0.94	0.93	0.92	0.91	0.90	0.89	0.88	0.87	0.86	0.85	0.84	0.83	0.82	0.81	0.80	0.79	0.78	0.77
11	2.03	1.70	1.52	1.39	1.31	1.24	1.18	1.14	1.11	1.08	1.05	1.03	1.01	0.99	0.98	0.96	0.94	0.93	0.92	0.91	0.90	0.89	0.88	0.87	0.86	0.85	0.84	0.83	0.82	0.81	0.80	0.79	0.78	0.77	0.76	0.75	0.74
12	2.01	1.68	1.50	1.37	1.28	1.22	1.16	1.12	1.09	1.05	1.03	1.01	0.99	0.97	0.96	0.94	0.93	0.92	0.91	0.90	0.89	0.88	0.87	0.86	0.85	0.84	0.83	0.82	0.81	0.80	0.79	0.78	0.77	0.76	0.75	0.74	0.73
13	1.99	1.67	1.48	1.36	1.27	1.20	1.15	1.10	1.07	1.04	1.01	0.99	0.97	0.95	0.93	0.92	0.90	0.89	0.88	0.87	0.86	0.85	0.84	0.83	0.82	0.81	0.80	0.79	0.78	0.77	0.76	0.75	0.74	0.73	0.72	0.71	0.70
14	1.97	1.66	1.46	1.34	1.25	1.18	1.13	1.09	1.05	1.02	0.99	0.97	0.95	0.93	0.92	0.90	0.89	0.88	0.87	0.86	0.85	0.84	0.83	0.82	0.81	0.80	0.79	0.78	0.77	0.76	0.75	0.74	0.73	0.72	0.71	0.70	0.69
15	1.96	1.64	1.45	1.33	1.24	1.17	1.12	1.07	1.04	1.00	0.98	0.96	0.94	0.92	0.90	0.89	0.87	0.86	0.85	0.84	0.83	0.82	0.81	0.80	0.79	0.78	0.77	0.76	0.75	0.74	0.73	0.72	0.71	0.70	0.69	0.68	0.67
16	1.95	1.63	1.44	1.32	1.23	1.16	1.10	1.06	1.02	0.99	0.96	0.94	0.92	0.90	0.89	0.87	0.86	0.85	0.84	0.83	0.82	0.81	0.80	0.79	0.78	0.77	0.76	0.75	0.74	0.73	0.72	0.71	0.70	0.69	0.68	0.66	0.65
17	1.95	1.62	1.43	1.30	1.21	1.15	1.09	1.05	1.01	0.98	0.95	0.93	0.91	0.89	0.88	0.86	0.85	0.84	0.83	0.82	0.81	0.80	0.79	0.78	0.77	0.76	0.75	0.74	0.73	0.72	0.71	0.70	0.69	0.68	0.66	0.64	0.63
18	1.95	1.61	1.42	1.29	1.20	1.14	1.08	1.04	1.00	0.97	0.94	0.92	0.90	0.88	0.87	0.85	0.84	0.83	0.82	0.81	0.80	0.79	0.78	0.77	0.76	0.75	0.74	0.73	0.72	0.71	0.70	0.69	0.68	0.66	0.64	0.63	0.61
19	1.94	1.60	1.40	1.28	1.19	1.12	1.06	1.02	0.98	0.95	0.92	0.90	0.88	0.86	0.84	0.83	0.82	0.80	0.79	0.78	0.77	0.76	0.75	0.74	0.73	0.72	0.71	0.70	0.69	0.68	0.66	0.64	0.63	0.61	0.60	0.59	
20	1.94	1.59	1.40	1.27	1.18	1.11	1.05	1.01	0.97	0.94	0.92	0.90	0.88	0.86	0.84	0.83	0.81	0.80	0.79	0.78	0.77	0.76	0.75	0.74	0.73	0.72	0.71	0.70	0.69	0.68	0.66	0.64	0.63	0.61	0.60	0.59	
21	1.93	1.58	1.38	1.26	1.17	1.10	1.04	1.00	0.97	0.94	0.91	0.89	0.86	0.84	0.83	0.81	0.80	0.79	0.78	0.77	0.76	0.75	0.74	0.73	0.72	0.71	0.70	0.69	0.68	0.66	0.64	0.63	0.61	0.60	0.59	0.58	
22	1.93	1.57	1.38	1.25	1.17	1.10	1.04	1.00	0.96	0.93	0.90	0.88	0.85	0.84	0.82	0.81	0.79	0.78	0.77	0.76	0.75	0.74	0.73	0.72	0.71	0.70	0.69	0.68	0.66	0.64	0.63	0.61	0.60	0.59	0.58	0.57	
23	1.93	1.57	1.38	1.25	1.16	1.09	1.04	0.99	0.95	0.92	0.89	0.87	0.85	0.83	0.81	0.80	0.78	0.77	0.76	0.75	0.74	0.73	0.72	0.71	0.70	0.69	0.68	0.66	0.64	0.63	0.61	0.60	0.59	0.58	0.57	0.56	
24	1.92	1.56	1.37	1.25	1.16	1.09	1.04	0.99	0.95	0.91	0.89	0.86	0.84	0.82	0.81	0.79	0.78	0.77	0.76	0.75	0.74	0.73	0.72	0.71	0.70	0.69	0.68	0.66	0.64	0.63	0.61	0.60	0.59	0.58	0.57	0.56	0.55
25	1.92	1.56	1.37	1.24	1.15	1.08	1.03	0.98	0.94	0.91	0.88	0.86	0.84	0.82	0.80	0.78	0.77	0.76	0.75	0.74	0.73	0.72	0.71	0.70	0.69	0.68	0.66	0.64	0.63	0.61	0.60	0.59	0.58	0.57	0.56	0.55	0.54
26	1.92	1.56	1.37	1.24	1.15	1.08	1.03	0.98	0.94	0.91	0.88	0.86	0.84	0.82	0.80	0.78	0.77	0.76	0.75	0.74	0.73	0.72	0.71	0.70	0.69	0.68	0.66	0.64	0.63	0.61	0.60	0.59	0.58	0.57	0.56	0.55	0.54
27	1.92	1.56	1.37	1.24	1.15	1.08	1.03	0.98	0.94	0.91	0.88	0.86	0.84	0.82	0.80	0.78	0.77	0.76	0.75	0.74	0.73	0.72	0.71	0.70	0.69	0.68	0.66	0.64	0.63	0.61	0.60	0.59	0.58	0.57	0.56	0.55	0.54
28	1.92	1.56	1.37	1.24	1.15	1.08	1.03	0.98	0.94	0.91	0.88	0.86	0.84	0.82	0.80	0.78	0.77	0.76	0.75	0.74	0.73	0.72	0.71	0.70	0.69	0.68	0.66	0.64	0.63	0.61	0.60	0.59	0.58	0.57	0.56	0.55	0.54
29	1.92	1.56	1.37	1.24	1.15	1.08	1.03	0.98	0.94	0.91	0.88	0.86	0.84	0.82	0.80	0.78	0.77	0.76	0.75	0.74	0.73	0.72	0.71	0.70	0.69	0.68	0.66	0.64	0.63	0.61	0.60	0.59	0.58	0.57	0.56	0.55	0.54
30	1.92	1.56	1.37	1.24	1.15	1.08	1.03	0.98	0.94	0.91	0.88	0.86	0.84	0.82	0.80	0.78	0.77	0.76	0.75	0.74	0.73	0.72	0.71	0.70	0.69	0.68	0.66	0.64	0.63	0.61	0.60	0.59	0.58	0.57	0.56	0.55	0.54
35	1.95	1.54	1.36	1.23	1.14	1.07	1.01	0.97	0.93	0.90	0.87	0.85	0.83	0.81	0.79	0.78	0.77	0.76	0.75	0.74	0.73	0.72	0.71	0.70	0.69	0.68	0.66	0.64	0.63	0.61	0.60	0.59	0.58	0.57	0.56	0.55	0.54
40	1.95	1.53	1.34	1.22	1.13	1.06	0.99	0.95	0.91	0.88	0.85	0.82	0.80	0.78	0.76	0.75	0.73	0.72	0.71	0.70	0.69	0.68	0.67	0.66	0.65	0.64	0.63	0.62	0.61	0.60	0.59	0.58	0.57	0.56	0.55	0.54	0.53
45	1.94	1.52	1.33	1.20	1.11	1.04	0.98	0.94	0.89	0.86	0.83	0.81	0.79	0.77	0.75	0.73	0.72	0.71	0.70	0.69	0.68	0.67	0.66	0.65	0.64	0.63	0.62	0.61	0.60	0.59	0.58	0.57	0.56	0.55	0.54	0.53	0.52
50	1.93	1.51	1.32	1.19	1.10	1.03	0.97	0.92	0.88	0.85	0.82	0.79	0.77	0.75	0.73	0.72	0.71	0.70	0.69	0.68	0.67	0.66	0.65	0.64	0.63	0.62	0.61	0.60	0.59	0.58	0.57	0.56	0.55	0.54	0.53	0.52	0.51
55	1.92	1.50	1.31	1.18	1.09	1.02	0.96	0.91	0.87	0.84	0.81	0.78	0.76	0.74	0.72	0.71	0.69	0.68	0.67	0.66	0.65	0.64	0.63	0.62	0.61	0.60	0.59	0.58	0.57	0.56	0.55	0.54	0.53	0.52	0.51	0.50	0.49
60	1.91	1.49	1.30	1.17	1.08	1.01	0.95	0.90	0.86	0.83	0.79	0.77																									

Single-sided test $\alpha = .05$
Double-sided test $\alpha = .10$

Table 1

Double-sided test $\alpha = .10$

D	s	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	35	40	45	50	60	70	80	
2	2	2.58	2.15	1.85	1.69	1.59	1.52	1.47	1.43	1.40	1.38	1.36	1.35	1.33	1.32	1.31	1.30	1.29	1.29	1.28	1.27	1.27	1.26	1.26	1.26	1.25	1.25	1.25	1.24	1.24	1.23	1.22	1.21	1.21	1.20	1.20	1.19	1.18
3	3	2.15	1.85	1.54	1.43	1.38	1.34	1.32	1.31	1.30	1.29	1.28	1.27	1.26	1.25	1.25	1.24	1.24	1.23	1.23	1.22	1.22	1.21	1.21	1.20	1.20	1.19	1.19	1.18	1.18	1.17	1.16	1.15	1.14	1.13	1.12	1.11	1.10
4	4	1.85	1.54	1.27	1.20	1.15	1.11	1.09	1.07	1.06	1.05	1.04	1.03	1.02	1.01	1.00	0.99	0.98	0.97	0.96	0.95	0.94	0.93	0.92	0.91	0.91	0.90	0.89	0.88	0.87	0.86	0.85	0.84	0.83	0.82	0.81	0.80	0.79
5	5	1.69	1.43	1.27	1.18	1.13	1.08	1.05	1.03	1.01	0.99	0.97	0.95	0.93	0.91	0.89	0.88	0.87	0.86	0.85	0.84	0.83	0.82	0.81	0.80	0.79	0.78	0.77	0.76	0.75	0.74	0.73	0.72	0.71	0.70	0.69	0.68	0.67
6	6	1.59	1.34	1.20	1.11	1.05	1.00	0.96	0.93	0.91	0.89	0.87	0.85	0.83	0.81	0.80	0.79	0.78	0.77	0.76	0.75	0.74	0.73	0.72	0.71	0.70	0.69	0.68	0.67	0.66	0.65	0.64	0.63	0.62	0.61	0.60	0.59	0.58
7	7	1.52	1.28	1.15	1.06	1.00	0.95	0.90	0.86	0.84	0.83	0.81	0.80	0.79	0.78	0.77	0.76	0.75	0.74	0.73	0.72	0.71	0.70	0.69	0.68	0.67	0.66	0.65	0.64	0.63	0.62	0.61	0.60	0.59	0.58	0.57	0.56	0.55
8	8	1.47	1.24	1.11	1.02	0.96	0.90	0.85	0.81	0.79	0.78	0.76	0.75	0.74	0.73	0.72	0.71	0.70	0.69	0.68	0.67	0.66	0.65	0.64	0.63	0.62	0.61	0.60	0.59	0.58	0.57	0.56	0.55	0.54	0.53	0.52	0.51	0.50
9	9	1.43	1.21	1.08	0.99	0.93	0.87	0.82	0.80	0.78	0.76	0.75	0.74	0.73	0.72	0.71	0.70	0.69	0.68	0.67	0.66	0.65	0.64	0.63	0.62	0.61	0.60	0.59	0.58	0.57	0.56	0.55	0.54	0.53	0.52	0.51	0.50	0.49
10	10	1.40	1.18	1.05	0.97	0.91	0.85	0.80	0.77	0.75	0.74	0.73	0.72	0.71	0.70	0.69	0.68	0.67	0.66	0.65	0.64	0.63	0.62	0.61	0.60	0.59	0.58	0.57	0.56	0.55	0.54	0.53	0.52	0.51	0.50	0.49	0.48	0.47
11	11	1.38	1.16	1.03	0.95	0.89	0.84	0.81	0.78	0.76	0.74	0.72	0.70	0.69	0.68	0.67	0.66	0.65	0.64	0.63	0.62	0.61	0.60	0.59	0.58	0.57	0.56	0.55	0.54	0.53	0.52	0.51	0.50	0.49	0.48	0.47	0.46	0.45
12	12	1.36	1.14	1.01	0.93	0.87	0.83	0.79	0.76	0.74	0.72	0.70	0.69	0.68	0.67	0.66	0.65	0.64	0.63	0.62	0.61	0.60	0.59	0.58	0.57	0.56	0.55	0.54	0.53	0.52	0.51	0.50	0.49	0.48	0.47	0.46	0.45	0.44
13	13	1.35	1.13	1.00	0.92	0.86	0.82	0.78	0.75	0.72	0.70	0.69	0.68	0.67	0.66	0.65	0.64	0.63	0.62	0.61	0.60	0.59	0.58	0.57	0.56	0.55	0.54	0.53	0.52	0.51	0.50	0.49	0.48	0.47	0.46	0.45	0.44	0.43
14	14	1.33	1.12	0.99	0.91	0.85	0.80	0.76	0.73	0.71	0.69	0.67	0.66	0.65	0.64	0.63	0.62	0.61	0.60	0.59	0.58	0.57	0.56	0.55	0.54	0.53	0.52	0.51	0.50	0.49	0.48	0.47	0.46	0.45	0.44	0.43	0.42	0.41
15	15	1.31	1.10	0.98	0.90	0.84	0.79	0.75	0.72	0.70	0.68	0.66	0.65	0.63	0.62	0.61	0.60	0.59	0.58	0.57	0.56	0.55	0.54	0.53	0.52	0.51	0.50	0.49	0.48	0.47	0.46	0.45	0.44	0.43	0.42	0.41	0.40	0.39
16	16	1.31	1.09	0.97	0.89	0.83	0.78	0.74	0.71	0.69	0.67	0.65	0.64	0.62	0.61	0.60	0.59	0.58	0.57	0.56	0.55	0.54	0.53	0.52	0.51	0.50	0.49	0.48	0.47	0.46	0.45	0.44	0.43	0.42	0.41	0.40	0.39	0.38
17	17	1.30	1.09	0.96	0.88	0.82	0.77	0.73	0.70	0.68	0.66	0.64	0.63	0.62	0.60	0.59	0.58	0.57	0.56	0.55	0.54	0.53	0.52	0.51	0.50	0.49	0.48	0.47	0.46	0.45	0.44	0.43	0.42	0.41	0.40	0.39	0.38	0.37
18	18	1.29	1.08	0.95	0.87	0.81	0.76	0.72	0.69	0.67	0.65	0.63	0.62	0.60	0.59	0.58	0.57	0.56	0.55	0.54	0.53	0.52	0.51	0.50	0.49	0.48	0.47	0.46	0.45	0.44	0.43	0.42	0.41	0.40	0.39	0.38	0.37	0.36
19	19	1.29	1.07	0.95	0.86	0.80	0.75	0.72	0.69	0.67	0.64	0.63	0.61	0.60	0.59	0.58	0.57	0.56	0.55	0.54	0.53	0.52	0.51	0.50	0.49	0.48	0.47	0.46	0.45	0.44	0.43	0.42	0.41	0.40	0.39	0.38	0.37	0.36
20	20	1.28	1.07	0.94	0.86	0.80	0.75	0.71	0.68	0.66	0.64	0.62	0.60	0.59	0.57	0.56	0.55	0.54	0.53	0.52	0.51	0.50	0.49	0.48	0.47	0.46	0.45	0.44	0.43	0.42	0.41	0.40	0.39	0.38	0.37	0.36	0.35	
21	21	1.27	1.06	0.94	0.85	0.79	0.74	0.71	0.68	0.66	0.64	0.62	0.60	0.59	0.57	0.56	0.55	0.54	0.53	0.52	0.51	0.50	0.49	0.48	0.47	0.46	0.45	0.44	0.43	0.42	0.41	0.40	0.39	0.38	0.37	0.36	0.35	
22	22	1.27	1.05	0.93	0.79	0.73	0.70	0.67	0.65	0.63	0.61	0.59	0.58	0.57	0.56	0.55	0.54	0.53	0.52	0.51	0.50	0.49	0.48	0.47	0.46	0.45	0.44	0.43	0.42	0.41	0.40	0.39	0.38	0.37	0.36	0.35	0.34	
23	23	1.26	1.05	0.93	0.78	0.72	0.70	0.67	0.64	0.62	0.60	0.59	0.57	0.56	0.55	0.54	0.53	0.52	0.51	0.50	0.49	0.48	0.47	0.46	0.45	0.44	0.43	0.42	0.41	0.40	0.39	0.38	0.37	0.36	0.35	0.34	0.33	
24	24	1.26	1.05	0.92	0.84	0.78	0.73	0.69	0.66	0.64	0.62	0.61	0.59	0.58	0.57	0.56	0.55	0.54	0.53	0.52	0.51	0.50	0.49	0.48	0.47	0.46	0.45	0.44	0.43	0.42	0.41	0.40	0.39	0.38	0.37	0.36	0.35	
25	25	1.26	1.04	0.92	0.83	0.77	0.73	0.69	0.66	0.63	0.61	0.59	0.58	0.57	0.56	0.55	0.54	0.53	0.52	0.51	0.50	0.49	0.48	0.47	0.46	0.45	0.44	0.43	0.42	0.41	0.40	0.39	0.38	0.37	0.36	0.35	0.34	
26	26	1.25	1.04	0.91	0.83	0.77	0.72	0.69	0.66	0.63	0.61	0.59	0.58	0.57	0.56	0.55	0.54	0.53	0.52	0.51	0.50	0.49	0.48	0.47	0.46	0.45	0.44	0.43	0.42	0.41	0.40	0.39	0.38	0.37	0.36	0.35	0.34	
27	27	1.25	1.04	0.91	0.83	0.77	0.72	0.68	0.65	0.63	0.60	0.59	0.57	0.56	0.54	0.53	0.52	0.51	0.50	0.49	0.48	0.47	0.46	0.45	0.44	0.43	0.42	0.41	0.40	0.39	0.38	0.37	0.36	0.35	0.34	0.33	0.32	
28	28	1.25	1.03	0.91	0.82	0.76	0.72	0.68	0.65	0.62	0.60	0.58	0.57	0.55	0.54	0.53	0.52	0.51	0.50	0.49	0.48	0.47	0.46	0.45	0.44	0.43	0.42	0.41	0.40	0.39	0.38	0.37	0.36	0.35	0.34	0.33	0.32	
29	29	1.24	1.03	0.91	0.82	0.76	0.71	0.67	0.64	0.62	0.60	0.58	0.56	0.55	0.54	0.52	0.51	0.50	0.49	0.48	0.47	0.46	0.45	0.44	0.43	0.42	0.41	0.40	0.39	0.38	0.37	0.36	0.35	0.34	0.33	0.32	0.31	
30	30	1.24	1.03	0.90	0.82	0.76	0.71	0.67	0.64	0.62	0.60	0.58	0.56	0.55	0.53	0.52	0.51	0.50	0.49	0.48	0.47	0.46	0.45	0.44	0.43	0.42	0.41	0.40	0.39	0.38	0.37	0.36	0.35	0.34	0.33	0.32	0.31	
35	35	1.23	1.02	0.89	0.81	0.75	0.70	0.66	0.63	0.60	0.58	0.56	0.55	0.53	0.52	0.51	0.50	0.49	0.48	0.47	0.46	0.45	0.44	0.43	0.42	0.41	0.40	0.39	0.38	0.37	0.36	0.35	0.34	0.33	0.32	0.31	0.30	
40	40	1.22	1.01	0.88	0.80	0.74	0.69	0.65	0.62	0.59	0.57	0.55	0.54	0.52	0.51	0.50	0.48	0.47	0.46	0.45	0.44	0.43	0.42	0.41	0.40	0.39	0.38	0.37	0.36	0.35	0.34	0.33	0.32	0.31	0.30	0.29	0.28	
45	45	1.21	1.00	0.87	0.79	0.73	0.68	0.64	0.61	0.59	0.56	0.54	0.53	0.51	0.50	0.49	0.48	0.47	0.46	0.45	0.44	0.43	0.42	0.41	0.40	0.39	0.38	0.37	0.36	0.35	0.34	0.33	0.32	0.31	0.30	0.29	0.28	
50	50	1.21	0.99	0.86	0.78	0.72	0.67	0.63	0.60	0.57	0.55	0.53	0.52	0.50	0.49	0.48	0.47	0.46	0.45	0.44	0.43	0.42	0.41	0.40	0.39	0.38	0.37	0.36	0.35	0.34	0.33	0.32	0.31	0.30	0.29	0.28	0.27	
60	60	1.20	0.98	0.85	0.77	0.71	0.66	0.62	0.59	0.56	0.54	0.52	0.50	0.49	0.47	0.46	0.45	0.44	0.43	0.42	0.41	0.40	0.39	0.38	0.37	0.36	0.35	0.34	0.33	0.32	0.31	0.30	0.29	0.28	0.27	0.26		
70	70	1.20	0.98	0.85	0.77	0.71	0.66	0.62	0.59	0.56	0.54	0.52	0.50	0.49	0.47	0.46	0.45	0.44	0.43	0.42	0.41	0.40	0.39	0.38	0.37	0.36	0.35	0.34										

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1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION	
NAD Crane, Indiana		UNCLASSIFIED	
		2b. GROUP	
3. REFERENCE TITLE			
MINIMUM SAMPLE SIZES FOR COMPARISONS USING CONTINUOUS VARIABLES			
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)			
5. AUTHOR(S) (First name, middle initial, last name)			
Lila E. Massa			
6. REPORT DATE		7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
8 Oct 1969		33	
8a. CONTRACT OR GRANT NO.		9a. ORIGINATOR'S REPORT NUMBER(S)	
b. PROJECT NO.		RDTR No. 159	
c.		9b. OTHER REPORT NUMBER(S) (Any other numbers that may be assigned this report)	
d.			
10. DISTRIBUTION STATEMENT			
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11. SUPPLEMENTARY NOTES		12. SECURITY REL. MILITARY ACTIVITY	
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When comparing the means from two populations, minimum sample sizes to detect a given difference may be determined. Presented are tables which may be used when unequal as well as equal sample sizes are desired.			

DD FORM 1473

1 NOV 65
S/N 0101-807-6801

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