Formula/Table Card for Weiss's *Introductory Statistics, 9/e*

Larry R. Griffey

Notation

n = sample size
$\bar{x}$ = sample mean
s = sample stdev
Q_j = jth quartile
N = population size
μ = population mean
σ = population stdev
d = paired difference
$\hat{p}$ = sample proportion
p = population proportion
O = observed frequency
E = expected frequency

Chapter 3 Descriptive Measures

- Sample mean: $\bar{x} = \dfrac{\Sigma x_i}{n}$
- Range: Range = Max − Min
- Sample standard deviation:

$$s = \sqrt{\frac{\Sigma(x_i - \bar{x})^2}{n - 1}} \quad \text{or} \quad s = \sqrt{\frac{\Sigma x_i^2 - (\Sigma x_i)^2/n}{n - 1}}$$

- Interquartile range: IQR $= Q_3 - Q_1$
- Lower limit $= Q_1 - 1.5 \cdot \text{IQR}$, Upper limit $= Q_3 + 1.5 \cdot \text{IQR}$
- Population mean (mean of a variable): $\mu = \dfrac{\Sigma x_i}{N}$
- Population standard deviation (standard deviation of a variable):

$$\sigma = \sqrt{\frac{\Sigma(x_i - \mu)^2}{N}} \quad \text{or} \quad \sigma = \sqrt{\frac{\Sigma x_i^2}{N} - \mu^2}$$

- Standardized variable: $z = \dfrac{x - \mu}{\sigma}$

Chapter 4 Probability Concepts

- Probability for equally likely outcomes:

$$P(E) = \frac{f}{N}$$

where f denotes the number of ways event E can occur and N denotes the total number of outcomes possible.

- Special addition rule:

$$P(A \text{ or } B \text{ or } C \text{ or } \cdots) = P(A) + P(B) + P(C) + \cdots$$

($A, B, C, \ldots$ mutually exclusive)

- Complementation rule: $P(E) = 1 - P(\text{not } E)$
- General addition rule: $P(A \text{ or } B) = P(A) + P(B) - P(A \,\&\, B)$
- Conditional probability rule: $P(B \mid A) = \dfrac{P(A \,\&\, B)}{P(A)}$
- General multiplication rule: $P(A \,\&\, B) = P(A) \cdot P(B \mid A)$
- Special multiplication rule:

$$P(A \,\&\, B \,\&\, C \,\&\, \cdots) = P(A) \cdot P(B) \cdot P(C) \cdots$$

($A, B, C, \ldots$ independent)

- Rule of total probability:

$$P(B) = \sum_{j=1}^{k} P(A_j) \cdot P(B \mid A_j)$$

($A_1, A_2, \ldots, A_k$ mutually exclusive and exhaustive)

- Bayes's rule:

$$P(A_i \mid B) = \frac{P(A_i) \cdot P(B \mid A_i)}{\sum_{j=1}^{k} P(A_j) \cdot P(B \mid A_j)}$$

($A_1, A_2, \ldots, A_k$ mutually exclusive and exhaustive)

- Factorial: $k! = k(k - 1) \cdots 2 \cdot 1$
- Permutations rule: ${}_mP_r = \dfrac{m!}{(m - r)!}$
- Special permutations rule: ${}_mP_m = m!$
- Combinations rule: ${}_mC_r = \dfrac{m!}{r!(m - r)!}$
- Number of possible samples: ${}_NC_n = \dfrac{N!}{n!(N - n)!}$

Chapter 5 Discrete Random Variables

- Mean of a discrete random variable X: $\mu = \Sigma x P(X = x)$
- Standard deviation of a discrete random variable X:

$$\sigma = \sqrt{\Sigma(x - \mu)^2 P(X = x)} \quad \text{or} \quad \sigma = \sqrt{\Sigma x^2 P(X = x) - \mu^2}$$

- Factorial: $k! = k(k - 1) \cdots 2 \cdot 1$
- Binomial coefficient: $\dbinom{n}{x} = \dfrac{n!}{x!(n - x)!}$
- Binomial probability formula:

$$P(X = x) = \binom{n}{x} p^x (1 - p)^{n-x}$$

where n denotes the number of trials and p denotes the success probability.

- Mean of a binomial random variable: $\mu = np$
- Standard deviation of a binomial random variable:

$$\sigma = \sqrt{np(1 - p)}$$

- Poisson probability formula: $P(X = x) = e^{-\lambda} \dfrac{\lambda^x}{x!}$
- Mean of a Poisson random variable: $\mu = \lambda$
- Standard deviation of a Poisson random variable: $\sigma = \sqrt{\lambda}$

Chapter 6 The Normal Distribution

- z-score for an x-value: $z = \dfrac{x - \mu}{\sigma}$
- x-value for a z-score: $x = \mu + z \cdot \sigma$

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Chapter 7 The Sampling Distribution of the Sample Mean

- Mean of the variable $\bar{x}$: $\mu_{\bar{x}} = \mu$
- Standard deviation of the variable $\bar{x}$: $\sigma_{\bar{x}} = \sigma/\sqrt{n}$

Chapter 8 Confidence Intervals for One Population Mean

- Standardized version of the variable $\bar{x}$:
$$z = \frac{\bar{x} - \mu}{\sigma/\sqrt{n}}$$
- z-interval for μ (σ known, normal population or large sample):
$$\bar{x} \pm z_{\alpha/2} \cdot \frac{\sigma}{\sqrt{n}}$$
- Margin of error for the estimate of μ: $E = z_{\alpha/2} \cdot \dfrac{\sigma}{\sqrt{n}}$
- Sample size for estimating μ:
$$n = \left(\frac{z_{\alpha/2} \cdot \sigma}{E}\right)^2$$
rounded up to the nearest whole number.
- Studentized version of the variable $\bar{x}$:
$$t = \frac{\bar{x} - \mu}{s/\sqrt{n}}$$
- t-interval for μ (σ unknown, normal population or large sample):
$$\bar{x} \pm t_{\alpha/2} \cdot \frac{s}{\sqrt{n}}$$
with df $= n - 1$.

Chapter 9 Hypothesis Tests for One Population Mean

- z-test statistic for H_0: $\mu = \mu_0$ (σ known, normal population or large sample):
$$z = \frac{\bar{x} - \mu_0}{\sigma/\sqrt{n}}$$
- t-test statistic for H_0: $\mu = \mu_0$ (σ unknown, normal population or large sample):
$$t = \frac{\bar{x} - \mu_0}{s/\sqrt{n}}$$
with df $= n - 1$.
- Symmetry property of a Wilcoxon signed-rank distribution:
$$W_{1-A} = n(n + 1)/2 - W_A$$
- Wilcoxon signed-rank test statistic for H_0: $\mu = \mu_0$ (symmetric population):
$$W = \text{sum of the positive ranks}$$

Chapter 10 Inferences for Two Population Means

- Pooled sample standard deviation:
$$s_p = \sqrt{\frac{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2}{n_1 + n_2 - 2}}$$
- Pooled t-test statistic for H_0: $\mu_1 = \mu_2$ (independent samples, normal populations or large samples, and equal population standard deviations):
$$t = \frac{\bar{x}_1 - \bar{x}_2}{s_p\sqrt{(1/n_1) + (1/n_2)}}$$
with df $= n_1 + n_2 - 2$.
- Pooled t-interval for $\mu_1 - \mu_2$ (independent samples, normal populations or large samples, and equal population standard deviations):
$$(\bar{x}_1 - \bar{x}_2) \pm t_{\alpha/2} \cdot s_p\sqrt{(1/n_1) + (1/n_2)}$$
with df $= n_1 + n_2 - 2$.
- Degrees of freedom for nonpooled t-procedures:
$$\Delta = \frac{[(s_1^2/n_1) + (s_2^2/n_2)]^2}{\dfrac{(s_1^2/n_1)^2}{n_1 - 1} + \dfrac{(s_2^2/n_2)^2}{n_2 - 1}}$$
rounded down to the nearest integer.
- Nonpooled t-test statistic for H_0: $\mu_1 = \mu_2$ (independent samples, and normal populations or large samples):
$$t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{(s_1^2/n_1) + (s_2^2/n_2)}}$$
with df $= \Delta$.
- Nonpooled t-interval for $\mu_1 - \mu_2$ (independent samples, and normal populations or large samples):
$$(\bar{x}_1 - \bar{x}_2) \pm t_{\alpha/2} \cdot \sqrt{(s_1^2/n_1) + (s_2^2/n_2)}$$
with df $= \Delta$.
- Symmetry property of a Mann–Whitney distribution:
$$M_{1-A} = n_1(n_1 + n_2 + 1) - M_A$$
- Mann–Whitney test statistic for H_0: $\mu_1 = \mu_2$ (independent samples and same-shape populations):
$$M = \text{sum of the ranks for sample data from Population 1}$$
- Paired t-test statistic for H_0: $\mu_1 = \mu_2$ (paired sample, and normal differences or large sample):
$$t = \frac{\bar{d}}{s_d/\sqrt{n}}$$
with df $= n - 1$.

- Paired t-interval for $\mu_1 - \mu_2$ (paired sample, and normal differences or large sample):
$$\bar{d} \pm t_{\alpha/2} \cdot \frac{s_d}{\sqrt{n}}$$
with df $= n - 1$.

- Paired Wilcoxon signed-rank test statistic for H_0: $\mu_1 = \mu_2$ (paired sample and symmetric differences):
$$W = \text{sum of the positive ranks}$$

Chapter 11 Inferences for Population Standard Deviations

- χ^2-test statistic for H_0: $\sigma = \sigma_0$ (normal population):
$$\chi^2 = \frac{n-1}{\sigma_0^2} s^2$$
with df $= n - 1$.
- χ^2-interval for σ (normal population):
$$\sqrt{\frac{n-1}{\chi^2_{\alpha/2}}} \cdot s \quad \text{to} \quad \sqrt{\frac{n-1}{\chi^2_{1-\alpha/2}}} \cdot s$$
with df $= n - 1$.

- F-test statistic for H_0: $\sigma_1 = \sigma_2$ (independent samples and normal populations):
$$F = s_1^2/s_2^2$$
with df $= (n_1 - 1, n_2 - 1)$.
- F-interval for σ_1/σ_2 (independent samples and normal populations):
$$\frac{1}{\sqrt{F_{\alpha/2}}} \cdot \frac{s_1}{s_2} \quad \text{to} \quad \frac{1}{\sqrt{F_{1-\alpha/2}}} \cdot \frac{s_1}{s_2}$$
with df $= (n_1 - 1, n_2 - 1)$.

Chapter 12 Inferences for Population Proportions

- Sample proportion:
$$\hat{p} = \frac{x}{n}$$
where x denotes the number of members in the sample that have the specified attribute.
- z-interval for p:
$$\hat{p} \pm z_{\alpha/2} \cdot \sqrt{\hat{p}(1-\hat{p})/n}$$
(*Assumption:* both x and $n - x$ are 5 or greater)
- Margin of error for the estimate of p:
$$E = z_{\alpha/2} \cdot \sqrt{\hat{p}(1-\hat{p})/n}$$
- Sample size for estimating p:
$$n = 0.25\left(\frac{z_{\alpha/2}}{E}\right)^2 \quad \text{or} \quad n = \hat{p}_g(1-\hat{p}_g)\left(\frac{z_{\alpha/2}}{E}\right)^2$$
rounded up to the nearest whole number (g = "educated guess")
- z-test statistic for H_0: $p = p_0$:
$$z = \frac{\hat{p} - p_0}{\sqrt{p_0(1-p_0)/n}}$$
(*Assumption:* both np_0 and $n(1 - p_0)$ are 5 or greater)
- Pooled sample proportion: $\hat{p}_p = \dfrac{x_1 + x_2}{n_1 + n_2}$

- z-test statistic for H_0: $p_1 = p_2$:
$$z = \frac{\hat{p}_1 - \hat{p}_2}{\sqrt{\hat{p}_p(1-\hat{p}_p)}\sqrt{(1/n_1) + (1/n_2)}}$$
(*Assumptions:* independent samples; x_1, $n_1 - x_1$, x_2, $n_2 - x_2$ are all 5 or greater)
- z-interval for $p_1 - p_2$:
$$(\hat{p}_1 - \hat{p}_2) \pm z_{\alpha/2} \cdot \sqrt{\hat{p}_1(1-\hat{p}_1)/n_1 + \hat{p}_2(1-\hat{p}_2)/n_2}$$
(*Assumptions:* independent samples; x_1, $n_1 - x_1$, x_2, $n_2 - x_2$ are all 5 or greater)
- Margin of error for the estimate of $p_1 - p_2$:
$$E = z_{\alpha/2} \cdot \sqrt{\hat{p}_1(1-\hat{p}_1)/n_1 + \hat{p}_2(1-\hat{p}_2)/n_2}$$
- Sample size for estimating $p_1 - p_2$:
$$n_1 = n_2 = 0.5\left(\frac{z_{\alpha/2}}{E}\right)^2$$
or
$$n_1 = n_2 = \left(\hat{p}_{1g}(1-\hat{p}_{1g}) + \hat{p}_{2g}(1-\hat{p}_{2g})\right)\left(\frac{z_{\alpha/2}}{E}\right)^2$$
rounded up to the nearest whole number (g = "educated guess")

Chapter 13 Chi-Square Procedures

- Expected frequencies for a chi-square goodness-of-fit test:
$$E = np$$
- Test statistic for a chi-square goodness-of-fit test:
$$\chi^2 = \Sigma(O - E)^2/E$$
with df $= c - 1$, where c is the number of possible values for the variable under consideration.
- Expected frequencies for a chi-square independence test or a chi-square homogeneity test:
$$E = \frac{R \cdot C}{n}$$
where R = row total and C = column total.

- Test statistic for a chi-square independence test:
$$\chi^2 = \Sigma(O - E)^2/E$$
with df $= (r - 1)(c - 1)$, where r and c are the number of possible values for the two variables under consideration.
- Test-statistic for a chi-square homogeneity test:
$$\chi^2 = \Sigma(O - E)^2/E$$
with df $= (r - 1)(c - 1)$, where r is the number of populations and c is the number of possible values for the variable under consideration.

Chapter 14 Descriptive Methods in Regression and Correlation

- S_{xx}, S_{xy}, and S_{yy}:
$$S_{xx} = \Sigma(x_i - \bar{x})^2 = \Sigma x_i^2 - (\Sigma x_i)^2/n$$
$$S_{xy} = \Sigma(x_i - \bar{x})(y_i - \bar{y}) = \Sigma x_i y_i - (\Sigma x_i)(\Sigma y_i)/n$$
$$S_{yy} = \Sigma(y_i - \bar{y})^2 = \Sigma y_i^2 - (\Sigma y_i)^2/n$$
- Regression equation: $\hat{y} = b_0 + b_1 x$, where
$$b_1 = \frac{S_{xy}}{S_{xx}} \quad \text{and} \quad b_0 = \frac{1}{n}(\Sigma y_i - b_1 \Sigma x_i) = \bar{y} - b_1\bar{x}$$
- Total sum of squares: $SST = \Sigma(y_i - \bar{y})^2 = S_{yy}$
- Regression sum of squares: $SSR = \Sigma(\hat{y}_i - \bar{y})^2 = S_{xy}^2/S_{xx}$
- Error sum of squares: $SSE = \Sigma(y_i - \hat{y}_i)^2 = S_{yy} - S_{xy}^2/S_{xx}$
- Regression identity: $SST = SSR + SSE$
- Coefficient of determination: $r^2 = \dfrac{SSR}{SST}$
- Linear correlation coefficient:
$$r = \frac{\frac{1}{n-1}\Sigma(x_i - \bar{x})(y_i - \bar{y})}{s_x s_y} \quad \text{or} \quad r = \frac{S_{xy}}{\sqrt{S_{xx}S_{yy}}}$$

Chapter 15 Inferential Methods in Regression and Correlation

- Population regression equation: $y = \beta_0 + \beta_1 x$
- Standard error of the estimate: $s_e = \sqrt{\dfrac{SSE}{n-2}}$
- Test statistic for H_0: $\beta_1 = 0$:
$$t = \frac{b_1}{s_e/\sqrt{S_{xx}}}$$
with df $= n - 2$.
- Confidence interval for β_1:
$$b_1 \pm t_{\alpha/2} \cdot \frac{s_e}{\sqrt{S_{xx}}}$$
with df $= n - 2$.
- Confidence interval for the conditional mean of the response variable corresponding to x_p:
$$\hat{y}_p \pm t_{\alpha/2} \cdot s_e\sqrt{\frac{1}{n} + \frac{(x_p - \Sigma x_i/n)^2}{S_{xx}}}$$
with df $= n - 2$.
- Prediction interval for an observed value of the response variable corresponding to x_p:
$$\hat{y}_p \pm t_{\alpha/2} \cdot s_e\sqrt{1 + \frac{1}{n} + \frac{(x_p - \Sigma x_i/n)^2}{S_{xx}}}$$
with df $= n - 2$.
- Test statistic for H_0: $\rho = 0$:
$$t = \frac{r}{\sqrt{\dfrac{1 - r^2}{n-2}}}$$
with df $= n - 2$.
- Test statistic for a correlation test for normality:
$$R_p = \frac{\Sigma x_i w_i}{\sqrt{S_{xx}\Sigma w_i^2}}$$
where x and w denote observations of the variable and the corresponding normal scores, respectively.

Chapter 16 Analysis of Variance (ANOVA)

- Notation in one-way ANOVA:
  - k = number of populations
  - n = total number of observations
  - $\bar{x}$ = mean of all n observations
  - n_j = size of sample from Population j
  - $\bar{x}_j$ = mean of sample from Population j
  - s_j^2 = variance of sample from Population j
  - T_j = sum of sample data from Population j
- Defining formulas for sums of squares in one-way ANOVA:
$$SST = \Sigma(x_i - \bar{x})^2$$
$$SSTR = \Sigma n_j(\bar{x}_j - \bar{x})^2$$
$$SSE = \Sigma(n_j - 1)s_j^2$$
- One-way ANOVA identity: $SST = SSTR + SSE$
- Computing formulas for sums of squares in one-way ANOVA:
$$SST = \Sigma x_i^2 - (\Sigma x_i)^2/n$$
$$SSTR = \Sigma(T_j^2/n_j) - (\Sigma x_i)^2/n$$
$$SSE = SST - SSTR$$
- Mean squares in one-way ANOVA:
$$MSTR = \frac{SSTR}{k-1} \qquad MSE = \frac{SSE}{n-k}$$
- Test statistic for one-way ANOVA (independent samples, normal populations, and equal population standard deviations):
$$F = \frac{MSTR}{MSE}$$
with df $= (k - 1, n - k)$.
- Confidence interval for $\mu_i - \mu_j$ in the Tukey multiple-comparison method (independent samples, normal populations, and equal population standard deviations):
$$(\bar{x}_i - \bar{x}_j) \pm \frac{q_\alpha}{\sqrt{2}} \cdot s\sqrt{(1/n_i) + (1/n_j)}$$
where $s = \sqrt{MSE}$ and q_α is obtained for a q-curve with parameters k and $n - k$.
- Test statistic for a Kruskal–Wallis test (independent samples, same-shape populations, all sample sizes 5 or greater):
$$H = \frac{SSTR}{SST/(n-1)} \quad \text{or} \quad H = \frac{12}{n(n+1)}\sum_{j=1}^{k}\frac{R_j^2}{n_j} - 3(n+1)$$
where $SSTR$ and SST are computed for the ranks of the data, and R_j denotes the sum of the ranks for the sample data from Population j. H has approximately a chi-square distribution with df $= k - 1$.

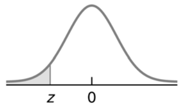

Table II Areas under the standard normal curve

0.09	0.08	0.07	0.06	0.05	0.04	0.03	0.02	0.01	0.00	z
									0.0000†	−3.9
0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	−3.8
0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	−3.7
0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	−3.6
0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	−3.5
0.0002	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	−3.4
0.0003	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0005	0.0005	0.0005	−3.3
0.0005	0.0005	0.0005	0.0006	0.0006	0.0006	0.0006	0.0006	0.0007	0.0007	−3.2
0.0007	0.0007	0.0008	0.0008	0.0008	0.0008	0.0009	0.0009	0.0009	0.0010	−3.1
0.0010	0.0010	0.0011	0.0011	0.0011	0.0012	0.0012	0.0013	0.0013	0.0013	−3.0
0.0014	0.0014	0.0015	0.0015	0.0016	0.0016	0.0017	0.0018	0.0018	0.0019	−2.9
0.0019	0.0020	0.0021	0.0021	0.0022	0.0023	0.0023	0.0024	0.0025	0.0026	−2.8
0.0026	0.0027	0.0028	0.0029	0.0030	0.0031	0.0032	0.0033	0.0034	0.0035	−2.7
0.0036	0.0037	0.0038	0.0039	0.0040	0.0041	0.0043	0.0044	0.0045	0.0047	−2.6
0.0048	0.0049	0.0051	0.0052	0.0054	0.0055	0.0057	0.0059	0.0060	0.0062	−2.5
0.0064	0.0066	0.0068	0.0069	0.0071	0.0073	0.0075	0.0078	0.0080	0.0082	−2.4
0.0084	0.0087	0.0089	0.0091	0.0094	0.0096	0.0099	0.0102	0.0104	0.0107	−2.3
0.0110	0.0113	0.0116	0.0119	0.0122	0.0125	0.0129	0.0132	0.0136	0.0139	−2.2
0.0143	0.0146	0.0150	0.0154	0.0158	0.0162	0.0166	0.0170	0.0174	0.0179	−2.1
0.0183	0.0188	0.0192	0.0197	0.0202	0.0207	0.0212	0.0217	0.0222	0.0228	−2.0
0.0233	0.0239	0.0244	0.0250	0.0256	0.0262	0.0268	0.0274	0.0281	0.0287	−1.9
0.0294	0.0301	0.0307	0.0314	0.0322	0.0329	0.0336	0.0344	0.0351	0.0359	−1.8
0.0367	0.0375	0.0384	0.0392	0.0401	0.0409	0.0418	0.0427	0.0436	0.0446	−1.7
0.0455	0.0465	0.0475	0.0485	0.0495	0.0505	0.0516	0.0526	0.0537	0.0548	−1.6
0.0559	0.0571	0.0582	0.0594	0.0606	0.0618	0.0630	0.0643	0.0655	0.0668	−1.5
0.0681	0.0694	0.0708	0.0721	0.0735	0.0749	0.0764	0.0778	0.0793	0.0808	−1.4
0.0823	0.0838	0.0853	0.0869	0.0885	0.0901	0.0918	0.0934	0.0951	0.0968	−1.3
0.0985	0.1003	0.1020	0.1038	0.1056	0.1075	0.1093	0.1112	0.1131	0.1151	−1.2
0.1170	0.1190	0.1210	0.1230	0.1251	0.1271	0.1292	0.1314	0.1335	0.1357	−1.1
0.1379	0.1401	0.1423	0.1446	0.1469	0.1492	0.1515	0.1539	0.1562	0.1587	−1.0
0.1611	0.1635	0.1660	0.1685	0.1711	0.1736	0.1762	0.1788	0.1814	0.1841	−0.9
0.1867	0.1894	0.1922	0.1949	0.1977	0.2005	0.2033	0.2061	0.2090	0.2119	−0.8
0.2148	0.2177	0.2206	0.2236	0.2266	0.2296	0.2327	0.2358	0.2389	0.2420	−0.7
0.2451	0.2483	0.2514	0.2546	0.2578	0.2611	0.2643	0.2676	0.2709	0.2743	−0.6
0.2776	0.2810	0.2843	0.2877	0.2912	0.2946	0.2981	0.3015	0.3050	0.3085	−0.5
0.3121	0.3156	0.3192	0.3228	0.3264	0.3300	0.3336	0.3372	0.3409	0.3446	−0.4
0.3483	0.3520	0.3557	0.3594	0.3632	0.3669	0.3707	0.3745	0.3783	0.3821	−0.3
0.3859	0.3897	0.3936	0.3974	0.4013	0.4052	0.4090	0.4129	0.4168	0.4207	−0.2
0.4247	0.4286	0.4325	0.4364	0.4404	0.4443	0.4483	0.4522	0.4562	0.4602	−0.1
0.4641	0.4681	0.4721	0.4761	0.4801	0.4840	0.4880	0.4920	0.4960	0.5000	−0.0

Second decimal place in z

† For $z \le -3.90$, the areas are 0.0000 to four decimal places.

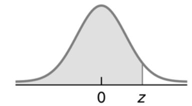

Table II (cont.) Areas under the standard normal curve

Second decimal place in z

z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.5000	0.5040	0.5080	0.5120	0.5160	0.5199	0.5239	0.5279	0.5319	0.5359
0.1	0.5398	0.5438	0.5478	0.5517	0.5557	0.5596	0.5636	0.5675	0.5714	0.5753
0.2	0.5793	0.5832	0.5871	0.5910	0.5948	0.5987	0.6026	0.6064	0.6103	0.6141
0.3	0.6179	0.6217	0.6255	0.6293	0.6331	0.6368	0.6406	0.6443	0.6480	0.6517
0.4	0.6554	0.6591	0.6628	0.6664	0.6700	0.6736	0.6772	0.6808	0.6844	0.6879
0.5	0.6915	0.6950	0.6985	0.7019	0.7054	0.7088	0.7123	0.7157	0.7190	0.7224
0.6	0.7257	0.7291	0.7324	0.7357	0.7389	0.7422	0.7454	0.7486	0.7517	0.7549
0.7	0.7580	0.7611	0.7642	0.7673	0.7704	0.7734	0.7764	0.7794	0.7823	0.7852
0.8	0.7881	0.7910	0.7939	0.7967	0.7995	0.8023	0.8051	0.8078	0.8106	0.8133
0.9	0.8159	0.8186	0.8212	0.8238	0.8264	0.8289	0.8315	0.8340	0.8365	0.8389
1.0	0.8413	0.8438	0.8461	0.8485	0.8508	0.8531	0.8554	0.8577	0.8599	0.8621
1.1	0.8643	0.8665	0.8686	0.8708	0.8729	0.8749	0.8770	0.8790	0.8810	0.8830
1.2	0.8849	0.8869	0.8888	0.8907	0.8925	0.8944	0.8962	0.8980	0.8997	0.9015
1.3	0.9032	0.9049	0.9066	0.9082	0.9099	0.9115	0.9131	0.9147	0.9162	0.9177
1.4	0.9192	0.9207	0.9222	0.9236	0.9251	0.9265	0.9279	0.9292	0.9306	0.9319
1.5	0.9332	0.9345	0.9357	0.9370	0.9382	0.9394	0.9406	0.9418	0.9429	0.9441
1.6	0.9452	0.9463	0.9474	0.9484	0.9495	0.9505	0.9515	0.9525	0.9535	0.9545
1.7	0.9554	0.9564	0.9573	0.9582	0.9591	0.9599	0.9608	0.9616	0.9625	0.9633
1.8	0.9641	0.9649	0.9656	0.9664	0.9671	0.9678	0.9686	0.9693	0.9699	0.9706
1.9	0.9713	0.9719	0.9726	0.9732	0.9738	0.9744	0.9750	0.9756	0.9761	0.9767
2.0	0.9772	0.9778	0.9783	0.9788	0.9793	0.9798	0.9803	0.9808	0.9812	0.9817
2.1	0.9821	0.9826	0.9830	0.9834	0.9838	0.9842	0.9846	0.9850	0.9854	0.9857
2.2	0.9861	0.9864	0.9868	0.9871	0.9875	0.9878	0.9881	0.9884	0.9887	0.9890
2.3	0.9893	0.9896	0.9898	0.9901	0.9904	0.9906	0.9909	0.9911	0.9913	0.9916
2.4	0.9918	0.9920	0.9922	0.9925	0.9927	0.9929	0.9931	0.9932	0.9934	0.9936
2.5	0.9938	0.9940	0.9941	0.9943	0.9945	0.9946	0.9948	0.9949	0.9951	0.9952
2.6	0.9953	0.9955	0.9956	0.9957	0.9959	0.9960	0.9961	0.9962	0.9963	0.9964
2.7	0.9965	0.9966	0.9967	0.9968	0.9969	0.9970	0.9971	0.9972	0.9973	0.9974
2.8	0.9974	0.9975	0.9976	0.9977	0.9977	0.9978	0.9979	0.9979	0.9980	0.9981
2.9	0.9981	0.9982	0.9982	0.9983	0.9984	0.9984	0.9985	0.9985	0.9986	0.9986
3.0	0.9987	0.9987	0.9987	0.9988	0.9988	0.9989	0.9989	0.9989	0.9990	0.9990
3.1	0.9990	0.9991	0.9991	0.9991	0.9992	0.9992	0.9992	0.9992	0.9993	0.9993
3.2	0.9993	0.9993	0.9994	0.9994	0.9994	0.9994	0.9994	0.9995	0.9995	0.9995
3.3	0.9995	0.9995	0.9995	0.9996	0.9996	0.9996	0.9996	0.9996	0.9996	0.9997
3.4	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9998
3.5	0.9998	0.9998	0.9998	0.9998	0.9998	0.9998	0.9998	0.9998	0.9998	0.9998
3.6	0.9998	0.9998	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999
3.7	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999
3.8	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999
3.9	1.0000†									

† For $z \ge 3.90$, the areas are 1.0000 to four decimal places.

Formula/Table Card for Weiss's *Introductory Statistics, 9/e*

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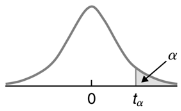

Table IV Values of t_α

df	$t_{0.10}$	$t_{0.05}$	$t_{0.025}$	$t_{0.01}$	$t_{0.005}$	df
1	3.078	6.314	12.706	31.821	63.657	*1*
2	1.886	2.920	4.303	6.965	9.925	*2*
3	1.638	2.353	3.182	4.541	5.841	*3*
4	1.533	2.132	2.776	3.747	4.604	*4*
5	1.476	2.015	2.571	3.365	4.032	*5*
6	1.440	1.943	2.447	3.143	3.707	*6*
7	1.415	1.895	2.365	2.998	3.499	*7*
8	1.397	1.860	2.306	2.896	3.355	*8*
9	1.383	1.833	2.262	2.821	3.250	*9*
10	1.372	1.812	2.228	2.764	3.169	*10*
11	1.363	1.796	2.201	2.718	3.106	*11*
12	1.356	1.782	2.179	2.681	3.055	*12*
13	1.350	1.771	2.160	2.650	3.012	*13*
14	1.345	1.761	2.145	2.624	2.977	*14*
15	1.341	1.753	2.131	2.602	2.947	*15*
16	1.337	1.746	2.120	2.583	2.921	*16*
17	1.333	1.740	2.110	2.567	2.898	*17*
18	1.330	1.734	2.101	2.552	2.878	*18*
19	1.328	1.729	2.093	2.539	2.861	*19*
20	1.325	1.725	2.086	2.528	2.845	*20*
21	1.323	1.721	2.080	2.518	2.831	*21*
22	1.321	1.717	2.074	2.508	2.819	*22*
23	1.319	1.714	2.069	2.500	2.807	*23*
24	1.318	1.711	2.064	2.492	2.797	*24*
25	1.316	1.708	2.060	2.485	2.787	*25*
26	1.315	1.706	2.056	2.479	2.779	*26*
27	1.314	1.703	2.052	2.473	2.771	*27*
28	1.313	1.701	2.048	2.467	2.763	*28*
29	1.311	1.699	2.045	2.462	2.756	*29*
30	1.310	1.697	2.042	2.457	2.750	*30*
31	1.309	1.696	2.040	2.453	2.744	*31*
32	1.309	1.694	2.037	2.449	2.738	*32*
33	1.308	1.692	2.035	2.445	2.733	*33*
34	1.307	1.691	2.032	2.441	2.728	*34*
35	1.306	1.690	2.030	2.438	2.724	*35*
36	1.306	1.688	2.028	2.434	2.719	*36*
37	1.305	1.687	2.026	2.431	2.715	*37*
38	1.304	1.686	2.024	2.429	2.712	*38*
39	1.304	1.685	2.023	2.426	2.708	*39*
40	1.303	1.684	2.021	2.423	2.704	*40*
41	1.303	1.683	2.020	2.421	2.701	*41*
42	1.302	1.682	2.018	2.418	2.698	*42*
43	1.302	1.681	2.017	2.416	2.695	*43*
44	1.301	1.680	2.015	2.414	2.692	*44*
45	1.301	1.679	2.014	2.412	2.690	*45*
46	1.300	1.679	2.013	2.410	2.687	*46*
47	1.300	1.678	2.012	2.408	2.685	*47*
48	1.299	1.677	2.011	2.407	2.682	*48*
49	1.299	1.677	2.010	2.405	2.680	*49*

Table IV (cont.) Values of t_α

df	$t_{0.10}$	$t_{0.05}$	$t_{0.025}$	$t_{0.01}$	$t_{0.005}$	df
50	1.299	1.676	2.009	2.403	2.678	*50*
51	1.298	1.675	2.008	2.402	2.676	*51*
52	1.298	1.675	2.007	2.400	2.674	*52*
53	1.298	1.674	2.006	2.399	2.672	*53*
54	1.297	1.674	2.005	2.397	2.670	*54*
55	1.297	1.673	2.004	2.396	2.668	*55*
56	1.297	1.673	2.003	2.395	2.667	*56*
57	1.297	1.672	2.002	2.394	2.665	*57*
58	1.296	1.672	2.002	2.392	2.663	*58*
59	1.296	1.671	2.001	2.391	2.662	*59*
60	1.296	1.671	2.000	2.390	2.660	*60*
61	1.296	1.670	2.000	2.389	2.659	*61*
62	1.295	1.670	1.999	2.388	2.657	*62*
63	1.295	1.669	1.998	2.387	2.656	*63*
64	1.295	1.669	1.998	2.386	2.655	*64*
65	1.295	1.669	1.997	2.385	2.654	*65*
66	1.295	1.668	1.997	2.384	2.652	*66*
67	1.294	1.668	1.996	2.383	2.651	*67*
68	1.294	1.668	1.995	2.382	2.650	*68*
69	1.294	1.667	1.995	2.382	2.649	*69*
70	1.294	1.667	1.994	2.381	2.648	*70*
71	1.294	1.667	1.994	2.380	2.647	*71*
72	1.293	1.666	1.993	2.379	2.646	*72*
73	1.293	1.666	1.993	2.379	2.645	*73*
74	1.293	1.666	1.993	2.378	2.644	*74*
75	1.293	1.665	1.992	2.377	2.643	*75*
80	1.292	1.664	1.990	2.374	2.639	*80*
85	1.292	1.663	1.988	2.371	2.635	*85*
90	1.291	1.662	1.987	2.368	2.632	*90*
95	1.291	1.661	1.985	2.366	2.629	*95*
100	1.290	1.660	1.984	2.364	2.626	*100*
200	1.286	1.653	1.972	2.345	2.601	*200*
300	1.284	1.650	1.968	2.339	2.592	*300*
400	1.284	1.649	1.966	2.336	2.588	*400*
500	1.283	1.648	1.965	2.334	2.586	*500*
600	1.283	1.647	1.964	2.333	2.584	*600*
700	1.283	1.647	1.963	2.332	2.583	*700*
800	1.283	1.647	1.963	2.331	2.582	*800*
900	1.282	1.647	1.963	2.330	2.581	*900*
1000	1.282	1.646	1.962	2.330	2.581	*1000*
2000	1.282	1.646	1.961	2.328	2.578	*2000*

1.282	1.645	1.960	2.326	2.576
$z_{0.10}$	$z_{0.05}$	$z_{0.025}$	$z_{0.01}$	$z_{0.005}$

Table V Values of W_α

n	$W_{0.10}$	$W_{0.05}$	$W_{0.025}$	$W_{0.01}$	$W_{0.005}$	*n*
7	22	24	26	28	—	*7*
8	28	30	32	34	36	*8*
9	34	37	39	42	43	*9*
10	41	44	47	50	52	*10*
11	48	52	55	59	61	*11*
12	56	61	64	68	71	*12*
13	65	70	74	78	81	*13*
14	74	79	84	89	92	*14*
15	83	90	95	100	104	*15*
16	94	100	106	112	117	*16*
17	104	112	118	125	130	*17*
18	116	124	131	138	143	*18*
19	128	136	144	152	158	*19*
20	140	150	158	167	173	*20*

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Table I Random numbers

Line number	00–09		10–19		20–29		30–39		40–49	
00	15544	80712	97742	21500	97081	42451	50623	56071	28882	28739
01	01011	21285	04729	39986	73150	31548	30168	76189	56996	19210
02	47435	53308	40718	29050	74858	64517	93573	51058	68501	42723
03	91312	75137	86274	59834	69844	19853	06917	17413	44474	86530
04	12775	08768	80791	16298	22934	09630	98862	39746	64623	32768
05	31466	43761	94872	92230	52367	13205	38634	55882	77518	36252
06	09300	43847	40881	51243	97810	18903	53914	31688	06220	40422
07	73582	13810	57784	72454	68997	72229	30340	08844	53924	89630
08	11092	81392	58189	22697	41063	09451	09789	00637	06450	85990
09	93322	98567	00116	35605	66790	52965	62877	21740	56476	49296
10	80134	12484	67089	08674	70753	90959	45842	59844	45214	36505
11	97888	31797	95037	84400	76041	96668	75920	68482	56855	97417
12	92612	27082	59459	69380	98654	20407	88151	56263	27126	63797
13	72744	45586	43279	44218	83638	05422	00995	70217	78925	39097
14	96256	70653	45285	26293	78305	80252	03625	40159	68760	84716
15	07851	47452	66742	83331	54701	06573	98169	37499	67756	68301
16	25594	41552	96475	56151	02089	33748	65289	89956	89559	33687
17	65358	15155	59374	80940	03411	94656	69440	47156	77115	99463
18	09402	31008	53424	21928	02198	61201	02457	87214	59750	51330
19	97424	90765	01634	37328	41243	33564	17884	94747	93650	77668

Column number

Table III Normal scores

Ordered position	n = 5	6	7	8	9	10	11	12	13
1	−1.18	−1.28	−1.36	−1.43	−1.50	−1.55	−1.59	−1.64	−1.68
2	−0.50	−0.64	−0.76	−0.85	−0.93	−1.00	−1.06	−1.11	−1.16
3	0.00	−0.20	−0.35	−0.47	−0.57	−0.65	−0.73	−0.79	−0.85
4	0.50	0.20	0.00	−0.15	−0.27	−0.37	−0.46	−0.53	−0.60
5	1.18	0.64	0.35	0.15	0.00	−0.12	−0.22	−0.31	−0.39
6		1.28	0.76	0.47	0.27	0.12	0.00	−0.10	−0.19
7			1.36	0.85	0.57	0.37	0.22	0.10	0.00
8				1.43	0.93	0.65	0.46	0.31	0.19
9					1.50	1.00	0.73	0.53	0.39
10						1.55	1.06	0.79	0.60
11							1.59	1.11	0.85
12								1.64	1.16
13									1.68

Table VI Values of M_α

n_2	α	n_1 = 3	4	5	6	7	8	9	10
	0.10	14	20	27	36	45	55	66	78
	0.05	15	21	29	37	46	57	68	80
3	0.025	—	22	30	38	48	58	70	82
	0.01	—	—	—	39	49	59	71	83
	0.005	—	—	—	—	—	60	72	85
	0.10	16	23	31	40	49	60	72	85
	0.05	17	24	32	41	51	62	74	87
4	0.025	18	25	33	43	53	64	76	89
	0.01	—	26	35	44	54	65	78	91
	0.005	—	—	—	45	55	66	79	93
	0.10	18	26	34	44	54	65	78	91
	0.05	20	27	36	46	56	68	80	94
5	0.025	21	28	37	47	58	70	83	96
	0.01	—	30	39	49	60	72	85	99
	0.005	—	—	40	50	61	73	86	101
	0.10	21	29	38	48	59	71	84	98
	0.05	22	30	40	50	61	73	87	101
6	0.025	23	32	41	52	63	76	89	103
	0.01	24	33	43	54	65	78	92	106
	0.005	—	34	44	55	67	80	94	108
	0.10	23	31	41	52	63	76	89	104
	0.05	24	33	43	54	66	79	93	107
7	0.025	26	35	45	56	68	81	95	110
	0.01	27	36	47	58	71	84	98	114
	0.005	—	37	48	60	72	86	101	116
	0.10	25	34	44	56	68	81	95	110
	0.05	27	36	47	58	71	84	99	114
8	0.025	28	38	49	61	73	87	102	117
	0.01	29	39	51	63	76	90	105	121
	0.005	30	40	52	65	78	92	108	124
	0.10	27	37	48	60	72	86	101	116
	0.05	29	39	50	63	76	90	105	121
9	0.025	31	41	53	65	78	93	108	124
	0.01	32	43	55	68	81	96	112	129
	0.005	33	44	56	70	84	99	114	131
	0.10	29	40	51	64	77	91	106	123
	0.05	31	42	54	67	80	95	111	127
10	0.025	33	44	56	69	83	98	114	131
	0.01	34	46	59	72	87	102	119	136
	0.005	36	48	61	74	89	105	121	139

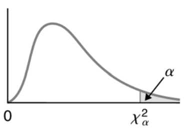

Table VII Values of χ^2_α

$\chi^2_{0.10}$	$\chi^2_{0.05}$	$\chi^2_{0.025}$	$\chi^2_{0.01}$	$\chi^2_{0.005}$	df
2.706	3.841	5.024	6.635	7.879	1
4.605	5.991	7.378	9.210	10.597	2
6.251	7.815	9.348	11.345	12.838	3
7.779	9.488	11.143	13.277	14.860	4
9.236	11.070	12.833	15.086	16.750	5
10.645	12.592	14.449	16.812	18.548	6
12.017	14.067	16.013	18.475	20.278	7
13.362	15.507	17.535	20.090	21.955	8
14.684	16.919	19.023	21.666	23.589	9
15.987	18.307	20.483	23.209	25.188	10
17.275	19.675	21.920	24.725	26.757	11
18.549	21.026	23.337	26.217	28.300	12
19.812	22.362	24.736	27.688	29.819	13
21.064	23.685	26.119	29.141	31.319	14
22.307	24.996	27.488	30.578	32.801	15
23.542	26.296	28.845	32.000	34.267	16
24.769	27.587	30.191	33.409	35.718	17
25.989	28.869	31.526	34.805	37.156	18
27.204	30.143	32.852	36.191	38.582	19
28.412	31.410	34.170	37.566	39.997	20
29.615	32.671	35.479	38.932	41.401	21
30.813	33.924	36.781	40.290	42.796	22
32.007	35.172	38.076	41.638	44.181	23
33.196	36.415	39.364	42.980	45.559	24
34.382	37.653	40.647	44.314	46.928	25
35.563	38.885	41.923	45.642	48.290	26
36.741	40.113	43.195	46.963	49.645	27
37.916	41.337	44.461	48.278	50.994	28
39.087	42.557	45.722	49.588	52.336	29
40.256	43.773	46.979	50.892	53.672	30
51.805	55.759	59.342	63.691	66.767	40
63.167	67.505	71.420	76.154	79.490	50
74.397	79.082	83.298	88.381	91.955	60
85.527	90.531	95.023	100.424	104.213	70
96.578	101.879	106.628	112.328	116.320	80
107.565	113.145	118.135	124.115	128.296	90
118.499	124.343	129.563	135.811	140.177	100

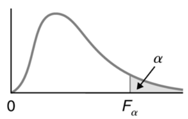

Table VIII Values of F_α

dfd	α	dfn 1	2	3	4	5	6	7	8	9
	0.10	39.86	49.50	53.59	55.83	57.24	58.20	58.91	59.44	59.86
	0.05	161.45	199.50	215.71	224.58	230.16	233.99	236.77	238.88	240.54
1	0.025	647.79	799.50	864.16	899.58	921.85	937.11	948.22	956.66	963.28
	0.01	4052.2	4999.5	5403.4	5624.6	5763.6	5859.0	5928.4	5981.1	6022.5
	0.005	16211	20000	21615	22500	23056	23437	23715	23925	24091
	0.10	8.53	9.00	9.16	9.24	9.29	9.33	9.35	9.37	9.38
	0.05	18.51	19.00	19.16	19.25	19.30	19.33	19.35	19.37	19.38
2	0.025	38.51	39.00	39.17	39.25	39.30	39.33	39.36	39.37	39.39
	0.01	98.50	99.00	99.17	99.25	99.30	99.33	99.36	99.37	99.39
	0.005	198.50	199.00	199.17	199.25	199.30	199.33	199.36	199.37	199.39
	0.10	5.54	5.46	5.39	5.34	5.31	5.28	5.27	5.25	5.24
	0.05	10.13	9.55	9.28	9.12	9.01	8.94	8.89	8.85	8.81
3	0.025	17.44	16.04	15.44	15.10	14.88	14.73	14.62	14.54	14.47
	0.01	34.12	30.82	29.46	28.71	28.24	27.91	27.67	27.49	27.35
	0.005	55.55	49.80	47.47	46.19	45.39	44.84	44.43	44.13	43.88
	0.10	4.54	4.32	4.19	4.11	4.05	4.01	3.98	3.95	3.94
	0.05	7.71	6.94	6.59	6.39	6.26	6.16	6.09	6.04	6.00
4	0.025	12.22	10.65	9.98	9.60	9.36	9.20	9.07	8.98	8.90
	0.01	21.20	18.00	16.69	15.98	15.52	15.21	14.98	14.80	14.66
	0.005	31.33	26.28	24.26	23.15	22.46	21.97	21.62	21.35	21.14
	0.10	4.06	3.78	3.62	3.52	3.45	3.40	3.37	3.34	3.32
	0.05	6.61	5.79	5.41	5.19	5.05	4.95	4.88	4.82	4.77
5	0.025	10.01	8.43	7.76	7.39	7.15	6.98	6.85	6.76	6.68
	0.01	16.26	13.27	12.06	11.39	10.97	10.67	10.46	10.29	10.16
	0.005	22.78	18.31	16.53	15.56	14.94	14.51	14.20	13.96	13.77
	0.10	3.78	3.46	3.29	3.18	3.11	3.05	3.01	2.98	2.96
	0.05	5.99	5.14	4.76	4.53	4.39	4.28	4.21	4.15	4.10
6	0.025	8.81	7.26	6.60	6.23	5.99	5.82	5.70	5.60	5.52
	0.01	13.75	10.92	9.78	9.15	8.75	8.47	8.26	8.10	7.98
	0.005	18.63	14.54	12.92	12.03	11.46	11.07	10.79	10.57	10.39
	0.10	3.59	3.26	3.07	2.96	2.88	2.83	2.78	2.75	2.72
	0.05	5.59	4.74	4.35	4.12	3.97	3.87	3.79	3.73	3.68
7	0.025	8.07	6.54	5.89	5.52	5.29	5.12	4.99	4.90	4.82
	0.01	12.25	9.55	8.45	7.85	7.46	7.19	6.99	6.84	6.72
	0.005	16.24	12.40	10.88	10.05	9.52	9.16	8.89	8.68	8.51
	0.10	3.46	3.11	2.92	2.81	2.73	2.67	2.62	2.59	2.56
	0.05	5.32	4.46	4.07	3.84	3.69	3.58	3.50	3.44	3.39
8	0.025	7.57	6.06	5.42	5.05	4.82	4.65	4.53	4.43	4.36
	0.01	11.26	8.65	7.59	7.01	6.63	6.37	6.18	6.03	5.91
	0.005	14.69	11.04	9.60	8.81	8.30	7.95	7.69	7.50	7.34

Table VIII (cont.) Values of F_α

dfd	α	dfn 1	2	3	4	5	6	7	8	9
	0.10	3.36	3.01	2.81	2.69	2.61	2.55	2.51	2.47	2.44
	0.05	5.12	4.26	3.86	3.63	3.48	3.37	3.29	3.23	3.18
9	0.025	7.21	5.71	5.08	4.72	4.48	4.32	4.20	4.10	4.03
	0.01	10.56	8.02	6.99	6.42	6.06	5.80	5.61	5.47	5.35
	0.005	13.61	10.11	8.72	7.96	7.47	7.13	6.88	6.69	6.54
	0.10	3.29	2.92	2.73	2.61	2.52	2.46	2.41	2.38	2.35
	0.05	4.96	4.10	3.71	3.48	3.33	3.22	3.14	3.07	3.02
10	0.025	6.94	5.46	4.83	4.47	4.24	4.07	3.95	3.85	3.78
	0.01	10.04	7.56	6.55	5.99	5.64	5.39	5.20	5.06	4.94
	0.005	12.83	9.43	8.08	7.34	6.87	6.54	6.30	6.12	5.97
	0.10	3.23	2.86	2.66	2.54	2.45	2.39	2.34	2.30	2.27
	0.05	4.84	3.98	3.59	3.36	3.20	3.09	3.01	2.95	2.90
11	0.025	6.72	5.26	4.63	4.28	4.04	3.88	3.76	3.66	3.59
	0.01	9.65	7.21	6.22	5.67	5.32	5.07	4.89	4.74	4.63
	0.005	12.23	8.91	7.60	6.88	6.42	6.10	5.86	5.68	5.54
	0.10	3.18	2.81	2.61	2.48	2.39	2.33	2.28	2.24	2.21
	0.05	4.75	3.89	3.49	3.26	3.11	3.00	2.91	2.85	2.80
12	0.025	6.55	5.10	4.47	4.12	3.89	3.73	3.61	3.51	3.44
	0.01	9.33	6.93	5.95	5.41	5.06	4.82	4.64	4.50	4.39
	0.005	11.75	8.51	7.23	6.52	6.07	5.76	5.52	5.35	5.20
	0.10	3.14	2.76	2.56	2.43	2.35	2.28	2.23	2.20	2.16
	0.05	4.67	3.81	3.41	3.18	3.03	2.92	2.83	2.77	2.71
13	0.025	6.41	4.97	4.35	4.00	3.77	3.60	3.48	3.39	3.31
	0.01	9.07	6.70	5.74	5.21	4.86	4.62	4.44	4.30	4.19
	0.005	11.37	8.19	6.93	6.23	5.79	5.48	5.25	5.08	4.94
	0.10	3.10	2.73	2.52	2.39	2.31	2.24	2.19	2.15	2.12
	0.05	4.60	3.74	3.34	3.11	2.96	2.85	2.76	2.70	2.65
14	0.025	6.30	4.86	4.24	3.89	3.66	3.50	3.38	3.29	3.21
	0.01	8.86	6.51	5.56	5.04	4.69	4.46	4.28	4.14	4.03
	0.005	11.06	7.92	6.68	6.00	5.56	5.26	5.03	4.86	4.72
	0.10	3.07	2.70	2.49	2.36	2.27	2.21	2.16	2.12	2.09
	0.05	4.54	3.68	3.29	3.06	2.90	2.79	2.71	2.64	2.59
15	0.025	6.20	4.77	4.15	3.80	3.58	3.41	3.29	3.20	3.12
	0.01	8.68	6.36	5.42	4.89	4.56	4.32	4.14	4.00	3.89
	0.005	10.80	7.70	6.48	5.80	5.37	5.07	4.85	4.67	4.54
	0.10	3.05	2.67	2.46	2.33	2.24	2.18	2.13	2.09	2.06
	0.05	4.49	3.63	3.24	3.01	2.85	2.74	2.66	2.59	2.54
16	0.025	6.12	4.69	4.08	3.73	3.50	3.34	3.22	3.12	3.05
	0.01	8.53	6.23	5.29	4.77	4.44	4.20	4.03	3.89	3.78
	0.005	10.58	7.51	6.30	5.64	5.21	4.91	4.69	4.52	4.38