Formulas and Tables

for *Elementary Statistics, Eighth Edition*, by Mario F. Triola

Ch. 2: Descriptive Statistics

$\bar{x} = \frac{\Sigma x}{n}$ Mean

$\bar{x} = \frac{\Sigma f \cdot x}{\Sigma f}$ Mean (frequency table)

$s = \sqrt{\frac{\Sigma(x - \bar{x})^2}{n - 1}}$ Standard deviation

$s = \sqrt{\frac{n(\Sigma x^2) - (\Sigma x)^2}{n(n - 1)}}$ Standard deviation (shortcut)

$s = \sqrt{\frac{n[\Sigma(f \cdot x^2)] - [\Sigma(f \cdot x)]^2}{n(n - 1)}}$ Standard deviation (frequency table)

variance $= s^2$

Ch. 3: Probability

$P(A \text{ or } B) = P(A) + P(B)$ if A, B are mutually exclusive

$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$ if A, B are not mutually exclusive

$P(A \text{ and } B) = P(A) \cdot P(B)$ if A, B are independent

$P(A \text{ and } B) = P(A) \cdot P(B|A)$ if A, B are dependent

$P(\bar{A}) = 1 - P(A)$ Rule of complements

${}_nP_r = \frac{n!}{(n - r)!}$ Permutations (no elements alike)

$\frac{n!}{n_1!\, n_2! \ldots n_k!}$ Permutations (n_1 alike, ...)

${}_nC_r = \frac{n!}{(n - r)!\, r!}$ Combinations

Ch. 4: Probability Distributions

$\mu = \Sigma x \cdot P(x)$ Mean (prob. dist.)

$\sigma = \sqrt{[\Sigma x^2 \cdot P(x)] - \mu^2}$ Standard deviation (prob. dist.)

$P(x) = \frac{n!}{(n - x)!\, x!} \cdot p^x \cdot q^{n-x}$ Binomial probability

$\mu = n \cdot p$ Mean (binomial)

$\sigma^2 = n \cdot p \cdot q$ Variance (binomial)

$\sigma = \sqrt{n \cdot p \cdot q}$ Standard deviation (binomial)

$P(x) = \frac{\mu^x \cdot e^{-\mu}}{x!}$ Poisson Distribution where $e \approx 2.71828$

Ch. 5: Normal Distribution

$z = \frac{x - \bar{x}}{s}$ or $\frac{x - \mu}{\sigma}$ Standard score

$\mu_{\bar{x}} = \mu$ Central limit theorem

$\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}}$ Central limit theorem (Standard error)

Ch. 6: Confidence Intervals (one population)

$\bar{x} - E < \mu < \bar{x} + E$ Mean

where $E = z_{\alpha/2}\frac{\sigma}{\sqrt{n}}$ (σ known or $n > 30$)

or $E = t_{\alpha/2}\frac{s}{\sqrt{n}}$ (σ unknown and $n \leq 30$)

$\hat{p} - E < p < \hat{p} + E$ Proportion

where $E = z_{\alpha/2}\sqrt{\frac{\hat{p}\hat{q}}{n}}$

$\frac{(n - 1)s^2}{\chi^2_R} < \sigma^2 < \frac{(n - 1)s^2}{\chi^2_L}$ Variance

Ch. 6: Sample Size Determination

$n = \left[\frac{z_{\alpha/2}\sigma}{E}\right]^2$ Mean

$n = \frac{[z_{\alpha/2}]^2 \cdot 0.25}{E^2}$ Proportion

$n = \frac{[z_{\alpha/2}]^2 \hat{p}\hat{q}}{E^2}$ Proportion ($\hat{p}$ and $\hat{q}$ are known)

Ch. 8: Confidence Intervals (two populations)

$\bar{d} - E < \mu_d < \bar{d} + E$ (Matched Pairs)

where $E = t_{\alpha/2}\frac{s_d}{\sqrt{n}}$ (df $= n - 1$)

$(\bar{x}_1 - \bar{x}_2) - E < (\mu_1 - \mu_2) < (\bar{x}_1 - \bar{x}_2) + E$ (Indep.)

where $E = z_{\alpha/2}\sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}$

(σ_1, σ_2 known or $n_1 > 30$ and $n_2 > 30$)

$E = t_{\alpha/2}\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}$ (df = smaller of $n_1 - 1$, $n_2 - 1$)

(unequal population variances and $n_1 \leq 30$ or $n_2 \leq 30$)

$E = t_{\alpha/2}\sqrt{\frac{s_p^2}{n_1} + \frac{s_p^2}{n_2}}$ (df $= n_1 + n_2 - 2$)

$s_p^2 = \frac{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2}{(n_1 - 1) + (n_2 - 1)}$

(equal population variances and $n_1 \leq 30$ or $n_2 \leq 30$)

$(\hat{p}_1 - \hat{p}_2) - E < (p_1 - p_2) < (\hat{p}_1 - \hat{p}_2) + E$

where $E = z_{\alpha/2}\sqrt{\frac{\hat{p}_1\hat{q}_1}{n_1} + \frac{\hat{p}_2\hat{q}_2}{n_2}}$

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Ch. 7: Test Statistics (one population)

$z = \dfrac{\bar{x} - \mu}{\sigma/\sqrt{n}}$ Mean—one population (σ known or $n > 30$)

$t = \dfrac{\bar{x} - \mu}{s/\sqrt{n}}$ Mean—one population (σ unknown and $n \le 30$)

$z = \dfrac{\hat{p} - p}{\sqrt{\dfrac{pq}{n}}}$ Proportion—one population

$\chi^2 = \dfrac{(n-1)s^2}{\sigma^2}$ Standard deviation or variance—one population

Ch. 8: Test Statistics (two populations)

$z = \dfrac{(\bar{x}_1 - \bar{x}_2) - (\mu_1 - \mu_2)}{\sqrt{\dfrac{\sigma_1^2}{n_1} + \dfrac{\sigma_2^2}{n_2}}}$ Two means—independent (σ_1, σ_2 known or $n_1 > 30$ and $n_2 > 30$)

$t = \dfrac{\bar{d} - \mu_d}{s_d/\sqrt{n}}$ Two means—matched pairs (df $= n - 1$)

$z = \dfrac{(\hat{p}_1 - \hat{p}_2) - (p_1 - p_2)}{\sqrt{\dfrac{\bar{p}\bar{q}}{n_1} + \dfrac{\bar{p}\bar{q}}{n_2}}}$ Two proportions

$F = \dfrac{s_1^2}{s_2^2}$ Standard deviation or variance—two populations (where $s_1^2 \ge s_2^2$)

$t = \dfrac{(\bar{x}_1 - \bar{x}_2) - (\mu_1 - \mu_2)}{\sqrt{\dfrac{s_1^2}{n_1} + \dfrac{s_2^2}{n_2}}}$ df = smaller of $n_1 - 1$, $n_2 - 1$

Two means—independent; unequal variances (and $n_1 \le 30$ or $n_2 \le 30$)

$t = \dfrac{(\bar{x}_1 - \bar{x}_2) - (\mu_1 - \mu_2)}{\sqrt{\dfrac{s_p^2}{n_1} + \dfrac{s_p^2}{n_2}}}$ (df $= n_1 + n_2 - 2$)

where $s_p^2 = \dfrac{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2}{n_1 + n_2 - 2}$

Two means—independent; equal variances (and $n_1 \le 30$ or $n_2 \le 30$)

Ch. 10: Multinomial and Contingency Tables

$\chi^2 = \Sigma \dfrac{(O - E)^2}{E}$ Multinomial (df $= k - 1$)

$\chi^2 = \Sigma \dfrac{(O - E)^2}{E}$ Contingency table [df $= (r - 1)(c - 1)$]

where $E = \dfrac{(\text{row total})(\text{column total})}{(\text{grand total})}$

Ch. 9: Linear Correlation/Regression

Correlation $r = \dfrac{n\Sigma xy - (\Sigma x)(\Sigma y)}{\sqrt{n(\Sigma x^2) - (\Sigma x)^2}\sqrt{n(\Sigma y^2) - (\Sigma y)^2}}$

$b_1 = \dfrac{n\Sigma xy - (\Sigma x)(\Sigma y)}{n(\Sigma x^2) - (\Sigma x)^2}$

$b_0 = \bar{y} - b_1\bar{x}$ or $b_0 = \dfrac{(\Sigma y)(\Sigma x^2) - (\Sigma x)(\Sigma xy)}{n(\Sigma x^2) - (\Sigma x)^2}$

$\hat{y} = b_0 + b_1 x$ Estimated eq. of regression line

$r^2 = \dfrac{\text{explained variation}}{\text{total variation}}$

$s_e = \sqrt{\dfrac{\Sigma(y - \hat{y})^2}{n - 2}}$ or $\sqrt{\dfrac{\Sigma y^2 - b_0\Sigma y - b_1\Sigma xy}{n - 2}}$

$\hat{y} - E < y < \hat{y} + E$

where $E = t_{\alpha/2} s_e \sqrt{1 + \dfrac{1}{n} + \dfrac{n(x_0 - \bar{x})^2}{n(\Sigma x^2) - (\Sigma x)^2}}$

Ch. 11: One-Way Analysis of a Variance

$F = \dfrac{ns_{\bar{x}}^2}{s_p^2}$ k samples each of size n (num. df $= k - 1$; den. df $= k(n - 1)$)

$F = \dfrac{\text{MS(treatment)}}{\text{MS(error)}}$ ← df $= k - 1$; ← df $= N - k$

$\text{MS(treatment)} = \dfrac{\text{SS(treatment)}}{k - 1}$

$\text{MS(error)} = \dfrac{\text{SS(error)}}{N - k}$ $\text{MS(total)} = \dfrac{\text{SS(total)}}{N - 1}$

$\text{SS(treatment)} = n_1(\bar{x}_1 - \bar{\bar{x}})^2 + \cdots + n_k(\bar{x}_k - \bar{\bar{x}})^2$

$\text{SS(error)} = (n_1 - 1)s_1^2 + \cdots + (n_k - 1)s_k^2$

$\text{SS(total)} = \Sigma(x - \bar{\bar{x}})^2$

$\text{SS(total)} = \text{SS(treatment)} + \text{SS(error)}$

Ch. 11: Two-Way Analysis of Variance

Interaction: $F = \dfrac{\text{MS(interaction)}}{\text{MS(error)}}$

Row Factor: $F = \dfrac{\text{MS(row factor)}}{\text{MS(error)}}$

Column Factor: $F = \dfrac{\text{MS(column factor)}}{\text{MS(error)}}$

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Ch. 13: Nonparametric Tests

$$z = \frac{(x + 0.5) - (n/2)}{\sqrt{n}/2}$$ Sign test for $n > 25$

$$z = \frac{T - n(n+1)/4}{\sqrt{\frac{n(n+1)(2n+1)}{24}}}$$ Wilcoxon signed ranks (matched pairs and $n > 30$)

$$z = \frac{R - \mu_R}{\sigma_R} = \frac{R - \frac{n_1(n_1+n_2+1)}{2}}{\sqrt{\frac{n_1 n_2(n_1+n_2+1)}{12}}}$$ Wilcoxon rank-sum (two independent samples)

$$H = \frac{12}{N(N+1)}\left(\frac{R_1^2}{n_1} + \frac{R_2^2}{n_2} + \dots + \frac{R_k^2}{n_k}\right) - 3(N+1)$$

Kruskal-Wallis (chi-square df $= k - 1$)

$$r_s = 1 - \frac{6\Sigma d^2}{n(n^2-1)}$$ Rank correlation

$\left(\text{critical value for } n > 30: \frac{\pm z}{\sqrt{n-1}}\right)$

$$z = \frac{G - \mu_G}{\sigma_G} = \frac{G - \left(\frac{2n_1n_2}{n_1+n_2} + 1\right)}{\sqrt{\frac{(2n_1n_2)(2n_1n_2 - n_1 - n_2)}{(n_1+n_2)^2(n_1+n_2-1)}}}$$ Runs test for $n > 20$

Ch. 12: Control Charts

R chart: Plot sample ranges

UCL: $D_4\overline{R}$

Centerline: $\overline{R}$

LCL: $D_3\overline{R}$

$\overline{x}$ chart: Plot sample means

UCL: $\overline{\overline{x}} + A_2\overline{R}$

Centerline: $\overline{\overline{x}}$

LCL: $\overline{\overline{x}} - A_2\overline{R}$

p chart: Plot sample proportions

UCL: $\overline{p} + 3\sqrt{\frac{\overline{p}\,\overline{q}}{n}}$

Centerline: $\overline{p}$

LCL: $\overline{p} - 3\sqrt{\frac{\overline{p}\,\overline{q}}{n}}$

TABLE A-6
Critical Values of the Pearson Correlation Coefficient *r*

n	$\alpha = .05$	$\alpha = .01$
4	.950	.999
5	.878	.959
6	.811	.917
7	.754	.875
8	.707	.834
9	.666	.798
10	.632	.765
11	.602	.735
12	.576	.708
13	.553	.684
14	.532	.661
15	.514	.641
16	.497	.623
17	.482	.606
18	.468	.590
19	.456	.575
20	.444	.561
25	.396	.505
30	.361	.463
35	.335	.430
40	.312	.402
45	.294	.378
50	.279	.361
60	.254	.330
70	.236	.305
80	.220	.286
90	.207	.269
100	.196	.256

NOTE: To test H_0: $\rho = 0$ against H_1: $\rho \neq 0$, reject H_0 if the absolute value of r is greater than the critical value in the table.

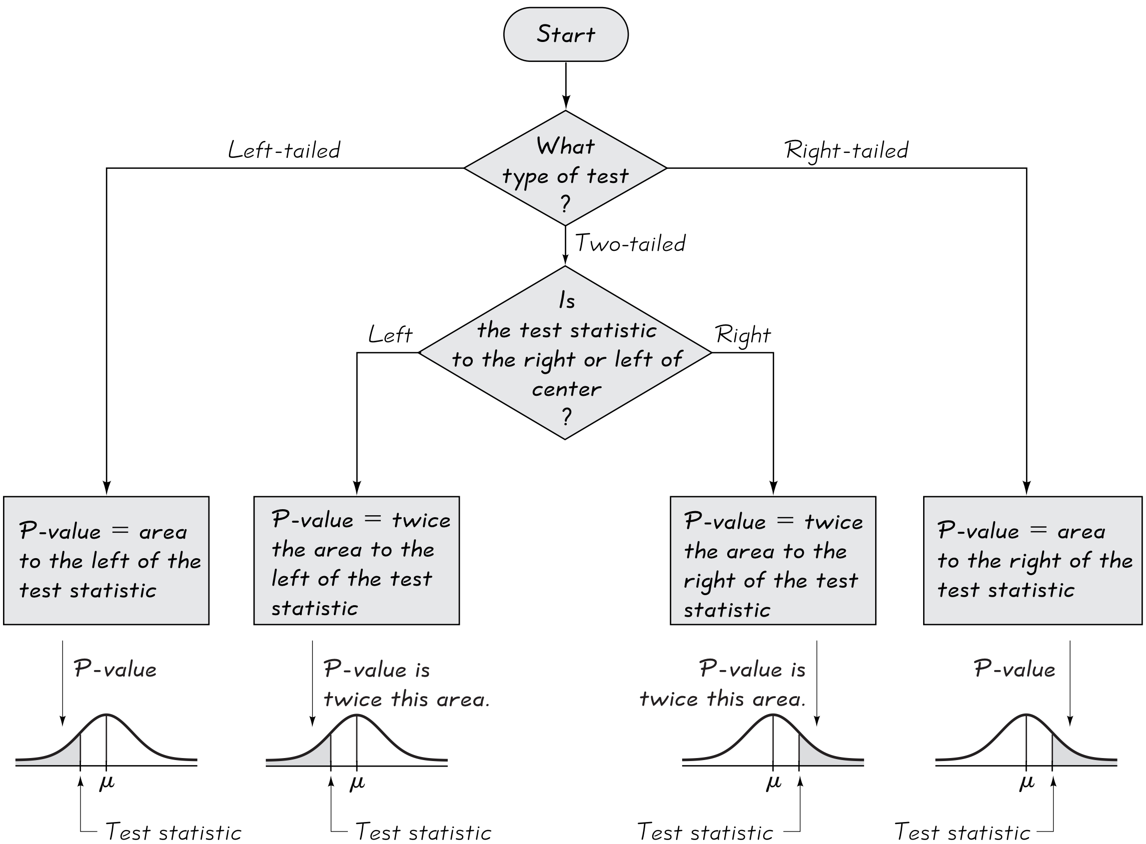
Control Chart Constants

Subgroup Size n	A_2	D_3	D_4
2	1.880	0.000	3.267
3	1.023	0.000	2.574
4	0.729	0.000	2.282
5	0.577	0.000	2.114
6	0.483	0.000	2.004
7	0.419	0.076	1.924

HYPOTHESIS TESTING

1. Identify the specific claim or hypothesis to be tested and put it in symbolic form.
2. Give the symbolic form that must be true when the original claim is false.
3. Of the two symbolic expressions obtained so far, let the null hypothesis H_0 be the one that contains the condition of equality; H_1 is the other statement.
4. Select the significance level α based on the seriousness of a type I error. Make α small if the consequences of rejecting a true H_0 are severe. The values of 0.05 and 0.01 are very common.
5. Identify the statistic that is relevant to this test, and identify its sampling distribution.
6. Determine the test statistic and either the P-value or the critical values, and the critical region. Draw a graph.
7. Reject H_0: Test statistic is in the critical region or P-value $\leq \alpha$. Fail to reject H_0: Test statistic is not in the critical region or P-value $> \alpha$.
8. Restate this previous conclusion in simple, nontechnical terms.

FINDING P-VALUES



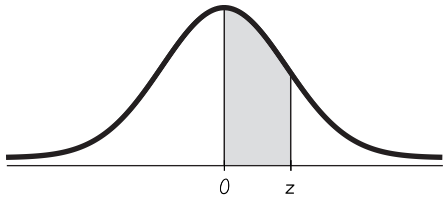


TABLE A-2 Standard Normal (*z*) Distribution

z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	.0000	.0040	.0080	.0120	.0160	.0199	.0239	.0279	.0319	.0359
0.1	.0398	.0438	.0478	.0517	.0557	.0596	.0636	.0675	.0714	.0753
0.2	.0793	.0832	.0871	.0910	.0948	.0987	.1026	.1064	.1103	.1141
0.3	.1179	.1217	.1255	.1293	.1331	.1368	.1406	.1443	.1480	.1517
0.4	.1554	.1591	.1628	.1664	.1700	.1736	.1772	.1808	.1844	.1879
0.5	.1915	.1950	.1985	.2019	.2054	.2088	.2123	.2157	.2190	.2224
0.6	.2257	.2291	.2324	.2357	.2389	.2422	.2454	.2486	.2517	.2549
0.7	.2580	.2611	.2642	.2673	.2704	.2734	.2764	.2794	.2823	.2852
0.8	.2881	.2910	.2939	.2967	.2995	.3023	.3051	.3078	.3106	.3133
0.9	.3159	.3186	.3212	.3238	.3264	.3289	.3315	.3340	.3365	.3389
1.0	.3413	.3438	.3461	.3485	.3508	.3531	.3554	.3577	.3599	.3621
1.1	.3643	.3665	.3686	.3708	.3729	.3749	.3770	.3790	.3810	.3830
1.2	.3849	.3869	.3888	.3907	.3925	.3944	.3962	.3980	.3997	.4015
1.3	.4032	.4049	.4066	.4082	.4099	.4115	.4131	.4147	.4162	.4177
1.4	.4192	.4207	.4222	.4236	.4251	.4265	.4279	.4292	.4306	.4319
1.5	.4332	.4345	.4357	.4370	.4382	.4394	.4406	.4418	.4429	.4441
1.6	.4452	.4463	.4474	.4484	.4495 *	.4505	.4515	.4525	.4535	.4545
1.7	.4554	.4564	.4573	.4582	.4591	.4599	.4608	.4616	.4625	.4633
1.8	.4641	.4649	.4656	.4664	.4671	.4678	.4686	.4693	.4699	.4706
1.9	.4713	.4719	.4726	.4732	.4738	.4744	.4750	.4756	.4761	.4767
2.0	.4772	.4778	.4783	.4788	.4793	.4798	.4803	.4808	.4812	.4817
2.1	.4821	.4826	.4830	.4834	.4838	.4842	.4846	.4850	.4854	.4857
2.2	.4861	.4864	.4868	.4871	.4875	.4878	.4881	.4884	.4887	.4890
2.3	.4893	.4896	.4898	.4901	.4904	.4906	.4909	.4911	.4913	.4916
2.4	.4918	.4920	.4922	.4925	.4927	.4929	.4931	.4932	.4934	.4936
2.5	.4938	.4940	.4941	.4943	.4945	.4946	.4948	.4949 *	.4951	.4952
2.6	.4953	.4955	.4956	.4957	.4959	.4960	.4961	.4962	.4963	.4964
2.7	.4965	.4966	.4967	.4968	.4969	.4970	.4971	.4972	.4973	.4974
2.8	.4974	.4975	.4976	.4977	.4977	.4978	.4979	.4979	.4980	.4981
2.9	.4981	.4982	.4982	.4983	.4984	.4984	.4985	.4985	.4986	.4986
3.0	.4987	.4987	.4987	.4988	.4988	.4989	.4989	.4989	.4990	.4990
3.10 and higher	.4999									

NOTE: For values of *z* above 3.09, use 0.4999 for the area.
*Use these common values that result from interpolation:

z score	Area
1.645	0.4500
2.575	0.4950

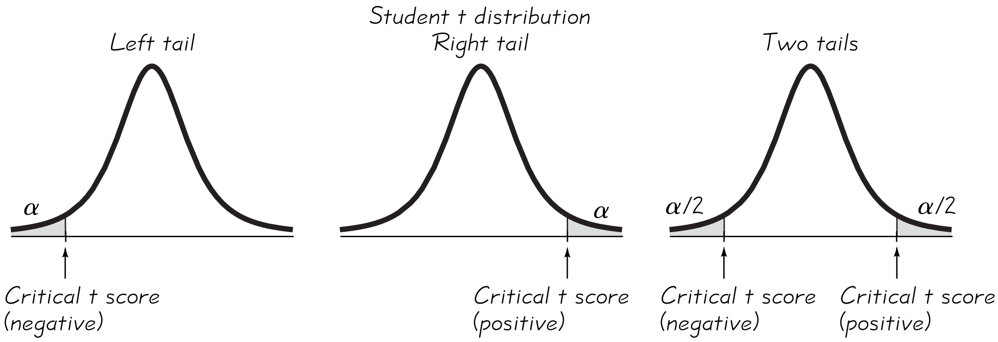


TABLE A-3 *t* Distribution

	α					
Degrees of Freedom	.005 (one tail) 0.01 (two tails)	.01 (one tail) .02 (two tails)	.025 (one tail) .05 (two tails)	.05 (one tail) .10 (two tails)	.10 (one tail) .20 (two tails)	.25 (one tail) .50 (two tails)
1	63.657	31.821	12.706	6.314	3.078	1.000
2	9.925	6.965	4.303	2.920	1.886	.816
3	5.841	4.541	3.182	2.353	1.638	.765
4	4.604	3.747	2.776	2.132	1.533	.741
5	4.032	3.365	2.571	2.015	1.476	.727
6	3.707	3.143	2.447	1.943	1.440	.718
7	3.500	2.998	2.365	1.895	1.415	.711
8	3.355	2.896	2.306	1.860	1.397	.706
9	3.250	2.821	2.262	1.833	1.383	.703
10	3.169	2.764	2.228	1.812	1.372	.700
11	3.106	2.718	2.201	1.796	1.363	.697
12	3.054	2.681	2.179	1.782	1.356	.696
13	3.012	2.650	2.160	1.771	1.350	.694
14	2.977	2.625	2.145	1.761	1.345	.692
15	2.947	2.602	2.132	1.753	1.341	.691
16	2.921	2.584	2.120	1.746	1.337	.690
17	2.898	2.567	2.110	1.740	1.333	.689
18	2.878	2.552	2.101	1.734	1.330	.688
19	2.861	2.540	2.093	1.729	1.328	.688
20	2.845	2.528	2.086	1.725	1.325	.687
21	2.831	2.518	2.080	1.721	1.323	.686
22	2.819	2.508	2.074	1.717	1.321	.686
23	2.807	2.500	2.069	1.714	1.320	.685
24	2.797	2.492	2.064	1.711	1.318	.685
25	2.787	2.485	2.060	1.708	1.316	.684
26	2.779	2.479	2.056	1.706	1.315	.684
27	2.771	2.473	2.052	1.703	1.314	.684
28	2.763	2.467	2.048	1.701	1.313	.683
29	2.756	2.462	2.045	1.699	1.311	.683
Large (z)	2.575	2.326	1.960	1.645	1.282	.675

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TABLE A-4 Chi-Square (χ^2) Distribution

Degrees of Freedom	Area to the Right of the Critical Value									
	0.995	0.99	0.975	0.95	0.90	0.10	0.05	0.025	0.01	0.005
1	—	—	0.001	0.004	0.016	2.706	3.841	5.024	6.635	7.879
2	0.010	0.020	0.051	0.103	0.211	4.605	5.991	7.378	9.210	10.597
3	0.072	0.115	0.216	0.352	0.584	6.251	7.815	9.348	11.345	12.838
4	0.207	0.297	0.484	0.711	1.064	7.779	9.488	11.143	13.277	14.860
5	0.412	0.554	0.831	1.145	1.610	9.236	11.071	12.833	15.086	16.750
6	0.676	0.872	1.237	1.635	2.204	10.645	12.592	14.449	16.812	18.548
7	0.989	1.239	1.690	2.167	2.833	12.017	14.067	16.013	18.475	20.278
8	1.344	1.646	2.180	2.733	3.490	13.362	15.507	17.535	20.090	21.955
9	1.735	2.088	2.700	3.325	4.168	14.684	16.919	19.023	21.666	23.589
10	2.156	2.558	3.247	3.940	4.865	15.987	18.307	20.483	23.209	25.188
11	2.603	3.053	3.816	4.575	5.578	17.275	19.675	21.920	24.725	26.757
12	3.074	3.571	4.404	5.226	6.304	18.549	21.026	23.337	26.217	28.299
13	3.565	4.107	5.009	5.892	7.042	19.812	22.362	24.736	27.688	29.819
14	4.075	4.660	5.629	6.571	7.790	21.064	23.685	26.119	29.141	31.319
15	4.601	5.229	6.262	7.261	8.547	22.307	24.996	27.488	30.578	32.801
16	5.142	5.812	6.908	7.962	9.312	23.542	26.296	28.845	32.000	34.267
17	5.697	6.408	7.564	8.672	10.085	24.769	27.587	30.191	33.409	35.718
18	6.265	7.015	8.231	9.390	10.865	25.989	28.869	31.526	34.805	37.156
19	6.844	7.633	8.907	10.117	11.651	27.204	30.144	32.852	36.191	38.582
20	7.434	8.260	9.591	10.851	12.443	28.412	31.410	34.170	37.566	39.997
21	8.034	8.897	10.283	11.591	13.240	29.615	32.671	35.479	38.932	41.401
22	8.643	9.542	10.982	12.338	14.042	30.813	33.924	36.781	40.289	42.796
23	9.260	10.196	11.689	13.091	14.848	32.007	35.172	38.076	41.638	44.181
24	9.886	10.856	12.401	13.848	15.659	33.196	36.415	39.364	42.980	45.559
25	10.520	11.524	13.120	14.611	16.473	34.382	37.652	40.646	44.314	46.928
26	11.160	12.198	13.844	15.379	17.292	35.563	38.885	41.923	45.642	48.290
27	11.808	12.879	14.573	16.151	18.114	36.741	40.113	43.194	46.963	49.645
28	12.461	13.565	15.308	16.928	18.939	37.916	41.337	44.461	48.278	50.993
29	13.121	14.257	16.047	17.708	19.768	39.087	42.557	45.722	49.588	52.336
30	13.787	14.954	16.791	18.493	20.599	40.256	43.773	46.979	50.892	53.672
40	20.707	22.164	24.433	26.509	29.051	51.805	55.758	59.342	63.691	66.766
50	27.991	29.707	32.357	34.764	37.689	63.167	67.505	71.420	76.154	79.490
60	35.534	37.485	40.482	43.188	46.459	74.397	79.082	83.298	88.379	91.952
70	43.275	45.442	48.758	51.739	55.329	85.527	90.531	95.023	100.425	104.215
80	51.172	53.540	57.153	60.391	64.278	96.578	101.879	106.629	112.329	116.321
90	59.196	61.754	65.647	69.126	73.291	107.565	113.145	118.136	124.116	128.299
100	67.328	70.065	74.222	77.929	82.358	118.498	124.342	129.561	135.807	140.169

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HYPOTHESIS TEST: WORDING OF FINAL CONCLUSION