Formulas for Computation

For the text discussion of each formula, refer to the page number at right.

Binomial Probability

$$\frac{n!}{x!(n-x)!}\,p^x q^{n-x}$$

154

χ^2 Test of Independence

$$\chi^2[(r-1)(c-1)] = \sum \frac{(o-e)^2}{e}$$

297

***Cohen's* d**

$$t\sqrt{\frac{1}{n_1}+\frac{1}{n_2}}$$

213

Correlation Coefficient

$$r_{XY} = \frac{\sum XY - (\sum X)(\sum Y)/n}{\sqrt{[\sum X^2 - (\sum X)^2/n][\sum Y^2 - (\sum Y)^2/n]}}$$

111

Fisher's* r *to* z *Transformation

$$\frac{1}{2}\ln\left[\frac{1+r}{1-r}\right]$$

275

Friedman Two-Way ANOVA

$$\left[\frac{12}{nk(k+1)}\right]\sum R_j^2 - 3n(k+1)$$

317

Goodness of Fit χ^2 Test

$$\chi^2(k-1) = \text{sum}\left[\frac{(\text{observed}-\text{expected})^2}{\text{expected}}\right]$$

301

Hotelling Test

$$t(n-3) = \frac{(r_{13}-r_{23})\sqrt{(n-1)(1+r_{12})}}{\sqrt{2K\frac{(n-1)}{(n-3)} + \frac{(r_{23}+r_{13})^2}{4}(1-r_{12})^3}}$$

279

where

$$K = 1 - r_{12}^2 - r_{13}^2 - r_{23}^2 + 2r_{12}r_{13}r_{23}$$

Intercept

$$a = \bar{Y} - b\bar{X}$$

99

Kruskal-Wallis ANOVA

$$H = \left[\frac{12}{N(N+1)}\right]\left[\sum \frac{R_j^2}{n_j}\right] - 3(N+1)$$

316

Logit Difference

$$\ln\left(\frac{a}{b}\right) - \ln\left(\frac{c}{d}\right)$$

134

154	***Mann-Whitney* U *Test***	$U = n_1 n_2 + \frac{n_1(n_1 + 1)}{2.0} - R$	312
297	***McNemar Test***	$\chi^2(1) = \frac{(\lvert a - d \rvert - 1.0)^2}{a + d}$	299
213	***Mean***	$\bar{X} = \frac{\sum X}{n}$	45
111	***One-Way ANOVA:*** ***Correction Term for the Mean***	$C = \frac{(\sum\sum X_{ij})^2}{N}$	232
275	***Omega Squared***	$\omega^2 = \frac{SS_A - (k-1)MS_{S/A}}{SS_{TOT} + MS_{S/A}}$	234
317	***SS Contrast***	$\frac{(\sum_j p_j T_{.j})^2}{n\sum p_j^2}$	237
301	***SS Groups (Equal* n*)***	$SS_A = \frac{\sum T_j^2}{n} - C$	233
279	***SS Groups (Unequal* n*)***	$SS_A = \sum \frac{T_j^2}{n_j} - C$	233
	SS Persons Within Groups	$SS_{S/A} = SS_{TOT} - SS_A$	233
99	***SS Total***	$SS_{TOT} = \sum\sum X_{ij}^2 - C$	233
316	***Paired* t *Test***	$t(n-1) = \frac{\bar{X}_D}{\sqrt{\frac{\sum D^2 - (\sum D)^2/n}{n(n-1)}}}$	211
134			

Formulas for Computation

(Continued from front endleaf.)

Pearson-Filon Test

$$Z = \frac{\sqrt{(n-3)}(z_{12} - z_{34})}{\sqrt{2 - Q(1-r^2)^2}} \qquad 280$$

where

$$Q = (r_{13} - r_{23}r)(r_{24} - r_{23}r) + (r_{14} - r_{13}r)(r_{23} - r_{13}r) + (r_{13} - r_{14}r)(r_{24} - r_{14}r) + (r_{14} - r_{24}r)(r_{23} - r_{24}r)$$

and

$$r = \frac{r_{12} + r_{34}}{2}$$

Percentage Difference

$$100\left[\frac{a}{a+b} - \frac{c}{c+d}\right] \qquad 135$$

Percentile Rank

$$100\left[\frac{R - .5}{n}\right] \qquad 84$$

Phi

$$\phi = \frac{ad - bc}{\sqrt{(a+b)(c+d)(a+c)(b+d)}} \qquad 133$$

Pooled Variance

$$s_p^2 = \frac{\sum X_1^2 - (\sum X_1)^2/n_1 + \sum X_2^2 - (\sum X_2)^2/n_2}{n_1 + n_2 - 2} \qquad 205$$

Predicted Score

$$\hat{Y} = a + bX \qquad 98$$

Regression Coefficient

$$b = \frac{\sum XY - (\sum X)(\sum Y)/n}{\sum X^2 - (\sum X)^2/n} \qquad 99$$

Sign Test

$$Z = \frac{|2c - n| - 1.0}{\sqrt{n}} \qquad 315$$

Spearman's Rho

$$r_S = 1 - \frac{6\sum D_i^2}{n(n^2-1)} \qquad 138$$

Standard Deviation

$$s = \sqrt{\frac{\sum X^2 - \frac{(\sum X)^2}{n}}{n-1}} \qquad 66$$

Test of Constant	$t(\mathrm{n}-1) = \dfrac{\bar{X} - M}{s/\sqrt{n}}$	190
Test of a Correlation Coefficient	$t(n-2) = \dfrac{r\sqrt{n-2}}{\sqrt{1-r^2}}$	272
Test of the Difference Between Regression Coefficients	$t(n_1+n_2-4) = \dfrac{b_1 - b_2}{s_{Y\cdot X}\sqrt{\dfrac{1}{\mathrm{SS}_{X_1}} + \dfrac{1}{\mathrm{SS}_{X_2}}}}$	285
Test of a Regression Coefficient	$t(n-2) = \dfrac{b_{YX}\sqrt{\mathrm{SS}_X}}{s_{Y\cdot X}}$	283
Test of Two Independent Correlations	$Z = \dfrac{z_1 - z_2}{\sqrt{\dfrac{1}{n_1 - 3} + \dfrac{1}{n_2 - 3}}}$	276
Test of Two Means	$t(n_1 + n_2 - 2) = \dfrac{\bar{X}_1 - \bar{X}_2}{s_p\sqrt{\dfrac{1}{n_1} + \dfrac{1}{n_2}}}$	205
Two-Way ANOVA: SS Interaction	$\mathrm{SS}_{A\times B} = \mathrm{SS}_{AB} - \mathrm{SS}_A - \mathrm{SS}_B$	256
df Interaction	$df_{A\times B} = (a-1)(b-1)$	257
Variance of Errors	$s_{Y\cdot X}{}^2 = \dfrac{n-1}{n-2}(s_Y{}^2 - b^2 s_X{}^2)$	99
Z Score	$Z_i = \dfrac{X_i - \bar{X}}{s}$	77
Z Test of **U**	$Z_U = \dfrac{U - n_1 n_2/2}{\sqrt{n_1 n_2(n_1 + n_2 + 1)/12}}$	313