

The Chi-square test statistic is:

$$\chi^2_{STAT} = \sum_{\text{all cells}} \frac{(f_o - f_e)^2}{f_e} \quad f_e = \frac{\text{row total} \times \text{column total}}{n}$$

The test statistic for the McNemar test:

$$Z_{STAT} = \frac{B - C}{\sqrt{B + C}}$$

McNemar test Contingency Table:

	Condition 2		
Condition 1	Yes	No	Totals
Yes	A	B	A+B
No	C	D	C+D
Totals	A+C	B+D	n

Wilcoxon Rank-Sum Test for Large Sample

$$Z_{STAT} = \frac{T_1 - \mu_{T_1}}{\sigma_{T_1}} = \frac{T_1 - \frac{n_1(n+1)}{2}}{\sqrt{\frac{n_1 n_2 (n+1)}{12}}}$$

The Kruskal-Wallis H-test statistic:

$$H = \left[ \frac{12}{n(n+1)} \sum_{j=1}^c \frac{T_j^2}{n_j} \right] - 3(n+1)$$

Simple Linear Regression Model

$$Y_i = \beta_0 + \beta_1 X_i + \epsilon_i \quad \hat{Y}_i = b_0 + b_1 X_i$$

Total variation is made up of two parts: SST = SSR + SSE

Coefficient of Determination

$$r^2 = \frac{SSR}{SST} = \frac{\text{regression sum of squares}}{\text{total sum of squares}}$$

Inference about the slope: t test with df = n - 2

$$t_{STAT} = \frac{b_1 - \beta_1}{S_{b_1}}$$

F test for overall significance with df1 = k, df2 = n - k - 1

$$F_{STAT} = \frac{MSR}{MSE}, \quad \begin{matrix} MSR = \frac{SSR}{k} \\ MSE = \frac{SSE}{n-k-1} \end{matrix}$$

Confidence interval estimate about the slope

$$b_1 \pm t_{\alpha/2} S_{b_1}$$

Multiple Regression model

$$Y_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \cdots + \beta_k X_{ki} + \varepsilon_i, \quad \hat{Y}_i = b_0 + b_1 X_{1i} + b_2 X_{2i} + \cdots + b_k X_{ki}$$

Adjusted R square

$$r_{adj}^2 = 1 - \left[ (1 - r^2) \left( \frac{n-1}{n-k-1} \right) \right]$$

Variance Inflation Factor

$$VIF_j = \frac{1}{1 - R_j^2}$$

Nonlinear Regression

$$Y_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \beta_3 X_{1i} X_{2i} + \varepsilon_i$$

Logistic Regression

$$\ln\left(\frac{\pi}{1-\pi}\right) = \beta_0 + \beta_1 x_1, \quad \pi = \frac{e^{\beta_0 + \beta_1 x}}{1 + e^{\beta_0 + \beta_1 x}}$$

Regression ANOVA table

Source	DF	Sum of Sq	Mean Sq	F Value	Pr(>F)
Regression	k	SSR	MSR	F	p-value
Residual	n-k-1	SSE	MSE		
Total	n-1	SST			