General Form of a Test Statistic

$$\frac{\textit{statistic} - \textit{hypothesized value}}{\textit{standard error of the statistic}}$$

One Sample Inference for Means

$$\bar{x} \pm t^* \frac{s}{\sqrt{n}} \qquad t = \frac{\bar{x} - \mu}{s/\sqrt{n}}$$

Two Sample Inference for Means

$$(\bar{x}_1 - \bar{x}_2) \pm t^* \sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}} \qquad t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}}$$

One Sample Inference for Proportions

$$\hat{p} \pm z^* \sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$$

Plus-4 method adds 2 successes and 2 failures to the sample.

$$z = \frac{\hat{p} - p_0}{\sqrt{\frac{p_0(1-p_0)}{n}}}$$

Two Sample Inference for Proportions

$$(\hat{p}_1 - \hat{p}_2) \pm z^* \sqrt{\frac{\hat{p}_1(1-\hat{p}_1)}{n_1} + \frac{\hat{p}_2(1-\hat{p}_2)}{n_2}}$$

Plus-4 method adds 1 successes and 1 failures to each group.

$$z = \frac{\hat{p}_1 - \hat{p}_2}{\sqrt{\hat{p}(1-\hat{p})\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}}$$

Chi-squared formulas

$$\chi^2 = \sum \frac{(\textit{observed count} - \textit{expected count})^2}{\textit{expected count}}$$

Expected counts for 2-way tables

$$E_{ij} = \frac{\textit{row total} \times \textit{column total}}{\textit{table total}}$$

Least squares regression line

$$\hat{y} = b_0 + b_1 x, \quad \text{where} \quad b_1 = r\frac{s_y}{s_x} \quad \text{and} \quad b_0 = \bar{y} - b_1\bar{x}$$

Bootstrap confidence interval

$$\textit{statistic} \pm t^* SE_{\text{bootstrap}} \text{ where } df = n - 1$$