Formula Sheet

Standardized Normal Data

$$z = \frac{\text{statistic} - \text{parameter}}{\text{standard deviation of the statistic}}$$

Least Squares Regression Line

$$y = mx + (\bar{y} - m\bar{x}) \quad \text{where} \quad m = r\frac{s_y}{s_x}$$

Addition & Multiplication Rule

$$\text{P}(A \text{ or } B) = \text{P}(A) + \text{P}(B) - \text{P}(A \text{ and } B) \qquad \text{P}(A \text{ and } B) = \text{P}(A) \cdot \text{P}(B)^*$$

**only if A and B are independent*

Standard Deviations for Sample Means and Sample Proportions

$$\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}} \qquad \sigma_{\hat{p}} = \sqrt{\frac{p(1-p)}{n}}$$

One Sample Inference for Proportions

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

Should have at least 15 successes and 15 failures

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

Should have $np_0 \geq 10$ and $n(1-p_0) \geq 10$

Two Sample Inference for Proportions

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

Should have at least 10 successes and 10 failures in each group

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

Should have 5 successes and 5 failures in each group
($\hat{p}$ is the pooled proportion)

One Sample Inference for Means

$$\bar{x} \pm t^*\frac{s}{\sqrt{n}} \qquad t = \frac{\bar{x} - \mu}{s/\sqrt{n}} \qquad dF = n - 1$$

Works best if the sample size is large (at least 30) or there is very little skew and no outliers in the sample.

Two Sample Inference for Means

$$(\bar{x}_1 - \bar{x}_2) \pm t^*\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}} \qquad t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}} \qquad dF = \min(n_1, n_2) - 1$$

Works best if the samples are large ($n_1 + n_2 \geq 30$) or there is very little skew and no outliers in either sample.