Statistics 221 Formula Sheet

$$\bar{x} = \frac{1}{n}\sum x_i \qquad s = \sqrt{\frac{\sum (x_i - \bar{x})^2}{n-1}} \qquad r = \frac{1}{n-1}\sum \frac{(x_i - \bar{x})}{s_x}\frac{(y_i - \bar{y})}{s_y} \qquad z = \frac{x - \mu}{\sigma} \qquad x = \mu + z\sigma$$

Means

$$z = \frac{\bar{x} - \mu_0}{\sigma/\sqrt{n}} \qquad \bar{x} \pm z^* \frac{\sigma}{\sqrt{n}} \qquad n = \left(\frac{z^*\sigma}{m}\right)^2$$

$$t = \frac{\bar{x} - \mu_0}{s/\sqrt{n}} \qquad \bar{x} \pm t^* \frac{s}{\sqrt{n}}$$

with df = n –1 with df = n –1

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

with df = smaller of $(n_1 - 1)$ and $(n_2 - 1)$ with df = smaller of $(n_1 - 1)$ and $(n_2 - 1)$

Proportions (for large samples – check conditions)

$$z = \frac{\hat{p} - p_0}{\sqrt{\frac{p_0(1-p_0)}{n}}} \qquad \hat{p} \pm z^* \sqrt{\frac{\hat{p}(1-\hat{p})}{n}} \qquad n = \left(\frac{z^*}{m}\right)^2 p^*(1-p^*)$$

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

Slope

$$t = \frac{b}{SE_b} \quad \text{with df = n –2} \qquad b \pm t^* SE_b \quad \text{with df = n –2}$$

Chi-square

$$X^2 = \sum \frac{(\text{observed count} - \text{expected count})^2}{\text{expected count}} \qquad \text{expected count} = \frac{\text{row total} \times \text{column total}}{\text{table total}}$$

with df = (r –1)(c –1)