# STAT 509 - Final Exam
## Formula Sheet

$$SST = \sum_{i=1}^{k} n_i (\bar{y}_i - \bar{y})^2 \qquad SSE = \sum_{i=1}^{k} (n_i - 1) s_i^2$$

$$MST = \frac{SST}{k-1} \qquad MSE = \frac{SSE}{n-k}$$

$$SS_{res} = \sum_{i=1}^{n} (y_i - \hat{y}_i)^2 = SS_{yy} - b_1 SS_{xy}$$

$$SS_{yy} = \sum y_i^2 - \frac{(\sum y_i)^2}{n} \qquad MS_{res} = \frac{SS_{res}}{n-2}$$

$$b_1 = \frac{SS_{xy}}{SS_{xx}} \qquad b_0 = \bar{y} - b_1 \bar{x}$$

$$SS_{xy} = \sum x_i y_i - \frac{(\sum x_i)(\sum y_i)}{n}$$

$$SS_{xx} = \sum x_i^2 - \frac{(\sum x_i)^2}{n}$$

$$\boxed{t = \frac{b_1}{se\{b_1\}} = \frac{b_1}{\sqrt{\frac{MS_{res}}{SS_{xx}}}}}$$

$$b_1 \pm t_{\alpha/2, n-2} \sqrt{\frac{MS_{res}}{SS_{xx}}}$$

$$r = \frac{SS_{xy}}{\sqrt{SS_{xx} SS_{yy}}}$$

$$R^2 = 1 - \frac{SS_{res}}{SS_{yy}}$$

$$\hat{y} \pm t_{\alpha/2,\, n-2} \sqrt{MS_{res}\left[\frac{1}{n} + \frac{(x_0 - \bar{x})^2}{SS_{xx}}\right]}$$

$$\hat{y} \pm t_{\alpha/2,\, n-2} \sqrt{MS_{res}\left[1 + \frac{1}{n} + \frac{(x_0 - \bar{x})^2}{SS_{xx}}\right]}$$

In multiple regression: $\boxed{MS_{res} = \frac{SS_{res}}{n-k-1}}$

$$\frac{a+ab}{2} - \frac{(1)+b}{2} \qquad \frac{b+ab}{2} - \frac{(1)+a}{2}$$

$$\frac{[ab-a]-[b-(1)]}{2}$$