STAT 515 – Summer I 2007 -- Final Exam -- Formula Sheet

ANOVA formulas:

$$\text{SST} = \sum_{i=1}^{p} n_i(\bar{X}_i - \bar{X})^2, \ \text{SSE} = \sum_{i=1}^{p}(n_i - 1)s_i^2$$

$$MST = \frac{SST}{p-1}, \ MSE = \frac{SSE}{n-p}.$$

Regression Formulas:

$$\hat{\beta}_1 = \frac{SS_{xy}}{SS_{xx}}, \ \hat{\beta}_0 = \bar{Y} - \hat{\beta}_1\bar{X}, \ SS_{xy} = \sum X_iY_i - \frac{(\sum X_i)(\sum Y_i)}{n},$$

$$SS_{xx} = \sum X_i^2 - \frac{(\sum X_i)^2}{n}, \ SS_{yy} = \sum Y_i^2 - \frac{(\sum Y_i)^2}{n},$$

$\text{MSE} = \dfrac{SSE}{n-2}$ where $\text{SSE} = \text{SS}_{yy} - \hat{\beta}_1 \text{SS}_{xy}$, $\quad s = \sqrt{MSE} = \sqrt{\dfrac{SSE}{n-2}}$

Test statistic for test of H_0: $\beta_1 = 0$: $t = \dfrac{\hat{\beta}_1}{s/\sqrt{SS_{xx}}}$, CI for β_1: $\hat{\beta}_1 \pm t_{\alpha/2}(s/\sqrt{SS_{xx}})$

$$r = \frac{SS_{xy}}{\sqrt{SS_{xx}SS_{yy}}}, \ r^2 = 1 - \frac{SSE}{SS_{yy}}$$

$(1 - \alpha)100\%$ Confidence Interval for $E(Y)$ at $X = x_p$:

$$\hat{Y} \pm (t_{\alpha/2})(s)\sqrt{\frac{1}{n} + \frac{(x_p - \bar{x})^2}{SS_{xx}}}$$

$(1 - \alpha)100\%$ Prediction Interval for Y at $X = x_p$:

$$\hat{Y} \pm (t_{\alpha/2})(s)\sqrt{1 + \frac{1}{n} + \frac{(x_p - \bar{x})^2}{SS_{xx}}}$$

Test statistic, test for multinomial probabilities: $\sum \dfrac{[n_i - E(n_i)]^2}{E(n_i)}$, where $\text{E}(n_i) = np_{i,0}$

Test statistic, test for independence: $\sum \dfrac{[n_{ij} - \hat{E}(n_{ij})]^2}{\hat{E}(n_{ij})}$, where $\hat{E}(n_{ij}) = r_i c_j / n$.