Formula Sheets – Final Exam material – STAT 515 Honors – Fall 2006

Test statistic (hypothesis test about μ):

$$t = \frac{\bar{x} - \mu_0}{s/\sqrt{n}}$$

Test statistic for μ_D in paired-sample t-test: Same as above but with $\bar{D}$ and s_D.

Test statistic (hypothesis test about p):

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

CI for $\mu_1 - \mu_2$:

$$(\bar{x}_1 - \bar{x}_2) \pm t_{\alpha/2}\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}$$

Test statistic (comparing two means, independent samples):

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

CI for $p_1 - p_2$:

$$(\hat{p}_1 - \hat{p}_2) \pm z_{\alpha/2}\sqrt{\frac{\hat{p}_1(1 - \hat{p}_1)}{n_1} + \frac{\hat{p}_2(1 - \hat{p}_2)}{n_2}}$$

Test statistic (comparing two proportions):

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

where $\hat{p}$ is the pooled sample proportion.

ANOVA table formulas:

$$MST = SST/(p-1), \; MSE = SSE/(n-p), \; F = MST/MSE$$

Regression and correlation formulas:

$$SS_{xy} = \sum x_i y_i - \frac{(\sum x_i)(\sum y_i)}{n}, \; SS_{xx} = \sum x_i^2 - \frac{(\sum x_i)^2}{n}, \; SS_{yy} = \sum y_i^2 - \frac{(\sum y_i)^2}{n}$$

$$\hat{\beta}_1 = SS_{xy}/SS_{xx}, \; \hat{\beta}_0 = \bar{Y} - \hat{\beta}_1 \bar{X}, \; s = \sqrt{MSE} = \sqrt{SSE/(n-2)},$$

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

Test statistic for test of model usefulness:

$$t = \frac{\hat{\beta}_1}{s/\sqrt{SS_{xx}}}$$

CI for β_1:

$$\hat{\beta}_1 \pm t_{\alpha/2}(s/\sqrt{SS_{xx}})$$

Test statistic, Test for Multinomial Probabilities:

$$\chi^2 = \sum \frac{[n_i - E(n_i)]^2}{E(n_i)}$$

where $E(n_i) = np_i$ is the expected cell count if H_0 is true.

Test statistic, Test for Independence:

$$\chi^2 = \sum \frac{[n_{ij} - \hat{E}(n_{ij})]^2}{\hat{E}(n_{ij})}$$

where $\hat{E}(n_{ij}) = r_i c_j / n$ is the expected count in cell (i, j) under independence.