STAT 515 – Spring 2018 -- Exam 3 -- Formula Sheets

Test statistic for t-test about μ: $\dfrac{\overline{X} - \mu_0}{s/\sqrt{n}}$

(For test about μ_D in paired-sample problems, test statistic is same except use $\overline{D}$ and s_D)

Test statistic for z-test about p: $\dfrac{\hat{p} - p_0}{\sqrt{\dfrac{p_0(1-p_0)}{n}}}$

$(\overline{X}_1 - \overline{X}_2) \pm t_{\alpha/2}\sqrt{\dfrac{s_1^2}{n_1} + \dfrac{s_2^2}{n_2}}$ where $t_{\alpha/2}$ is based on $\min(n_1 - 1, n_2 - 1)$ d.f., or

$(\overline{X}_1 - \overline{X}_2) \pm t_{\alpha/2}\sqrt{\dfrac{s_p^2}{n_1} + \dfrac{s_p^2}{n_2}}$ where $t_{\alpha/2}$ based on $n_1 + n_2 - 2$ d.f., and

$s_p^2 = \dfrac{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2}{n_1 + n_2 - 2}$.

Test statistic for comparing two means (independent samples):

$\dfrac{\overline{X}_1 - \overline{X}_2}{\sqrt{\dfrac{s_1^2}{n_1} + \dfrac{s_2^2}{n_2}}}$ or $\dfrac{\overline{X}_1 - \overline{X}_2}{\sqrt{\dfrac{s_p^2}{n_1} + \dfrac{s_p^2}{n_2}}}$

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

$\dfrac{\hat{p}_1 - \hat{p}_2}{\sqrt{\hat{p}\hat{q}\left(\dfrac{1}{n_1} + \dfrac{1}{n_2}\right)}}$ where $\hat{p}$ is the pooled sample proportion.

ANOVA formulas:

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

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

Regression Formulas:

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

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

MSE = $\frac{SSE}{n-2}$ where SSE = SS_{yy} - $\hat{\beta}_1 SS_{xy}$, $\quad s = \sqrt{MSE} = \sqrt{\frac{SSE}{n-2}}$