Formula Sheet – Final Exam – SCCC 312A

Classical (Wald) $1 - \alpha$ CI for $p$:

$$\left( \hat{p} - z(\alpha/2)\sqrt{\frac{\hat{p}(1 - \hat{p})}{n}}, \hat{p} + z(\alpha/2)\sqrt{\frac{\hat{p}(1 - \hat{p})}{n}} \right)$$

Agresti-Coull $1 - \alpha$ CI for $p$:

$$\left( \hat{p} - z(\alpha/2)\sqrt{\frac{\hat{p}(1 - \hat{p})}{\bar{n}}}, \hat{p} + z(\alpha/2)\sqrt{\frac{\hat{p}(1 - \hat{p})}{\bar{n}}} \right)$$

where $\bar{n} = n + [z(\alpha/2)]^2$ and $\bar{p} = \frac{x + 0.5[z(\alpha/2)]^2}{n}$.

$1 - \alpha$ CI for $\mu$:

$$\left( \bar{x} - t(n-1, \alpha/2)\frac{s}{\sqrt{n}}, \bar{x} + t(n-1, \alpha/2)\frac{s}{\sqrt{n}} \right)$$

Test statistic (hypothesis test about $\mu$):

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

CI and test statistics for $\mu_d$ in paired-sample $t$-test: Same as above but with $\bar{x}_d$ and $s_d$.

Test statistic (hypothesis test about $p$):

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

$1 - \alpha$ CI for $\mu_1 - \mu_2$:

$$\left( \bar{x}_1 - \bar{x}_2 \right) - t(df, \alpha/2)\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}, \left( \bar{x}_1 - \bar{x}_2 \right) + t(df, \alpha/2)\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}$$

Test statistic (comparing two means, independent samples):

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

$1 - \alpha$ CI for $p_1 - p_2$:

$$\left( \hat{p}_1 - \hat{p}_2 \right) - z(\alpha/2)\sqrt{\frac{\hat{p}_1(1 - \hat{p}_1)}{n_1} + \frac{\hat{p}_2(1 - \hat{p}_2)}{n_2}}, \left( \hat{p}_1 - \hat{p}_2 \right) + z(\alpha/2)\sqrt{\frac{\hat{p}_1(1 - \hat{p}_1)}{n_1} + \frac{\hat{p}_2(1 - \hat{p}_2)}{n_2}}$$

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.