Statistics Formula Sheet

Confidence Interval Estimate:

z-confidence interval: $\bar{x} \pm z_{\frac{\alpha}{2}} \cdot \frac{\sigma}{\sqrt{n}}$

t-confidence interval: $\bar{x} \pm t_{\frac{\alpha}{2}} \cdot \frac{s}{\sqrt{n}}$ (d.f. = $n - 1$)

Confidence interval for proportion: $p \pm z_{\frac{\alpha}{2}} \cdot \sqrt{\frac{p(1-p)}{n}}$

Confidence interval for difference of two means: $\bar{x}_1 - \bar{x}_2 \pm z_{\frac{\alpha}{2}} \cdot \sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}$

Confidence interval for difference of two means:

If $\sigma_1^2 = \sigma_2^2$, $\bar{x}_1 - \bar{x}_2 \pm t_{\frac{\alpha}{2}} \cdot \sqrt{\frac{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2}{n_1 + n_2 - 2} \cdot \left(\frac{1}{n_1} + \frac{1}{n_2}\right)}$, d.f. = $n_1 + n_2 - 2$

If $\sigma_1^2 \neq \sigma_2^2$, $\bar{x}_1 - \bar{x}_2 \pm t_{\frac{\alpha}{2}} \cdot \sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}$, $d.f. = \frac{\left(\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}\right)^2}{\frac{\left(\frac{s_1^2}{n_1}\right)^2}{n_1 - 1} + \frac{\left(\frac{s_2^2}{n_2}\right)^2}{n_2 - 1}}$

Hypothesis Testing:

z-test statistic: $z = \frac{\bar{x} - \mu_0}{\sigma / \sqrt{n}}$

t-test statistic: $t = \frac{\bar{x} - \mu_0}{s / \sqrt{n}}$ (d.f. = $n - 1$)

z-test for proportion: $z = \frac{p - \pi_0}{\sqrt{\frac{\pi_0(1 - \pi_0)}{n}}}$

z-test statistic for two means: $z = \frac{\bar{x}_1 - \bar{x}_2 - D_0}{\sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}}$

t-test statistic for two means:

If $\sigma_1^2 = \sigma_2^2$, $t = \frac{\bar{x}_1 - \bar{x}_2 - D_0}{\sqrt{\frac{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2}{n_1 + n_2 - 2} \cdot \left(\frac{1}{n_1} + \frac{1}{n_2}\right)}}$, d.f. = $n_1 + n_2 - 2$

If $\sigma_1^2 \neq \sigma_2^2$, $t = \frac{\bar{x}_1 - \bar{x}_2 - D_0}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}}$, the degrees of freedom is $d.f. = \frac{\left(\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}\right)^2}{\frac{\left(\frac{s_1^2}{n_1}\right)^2}{n_1 - 1} + \frac{\left(\frac{s_2^2}{n_2}\right)^2}{n_2 - 1}}$