Formula Cheat Sheet

$$T = \frac{\overline{x}-\mu_0}{\frac{s}{\sqrt{n}}} \sim t(n-1)$$

$$T = \frac{(\overline{x}_1-\overline{x}_2)-(\mu_1-\mu_2)}{s_p\sqrt{\frac{1}{n_1}+\frac{1}{n_2}}} \sim t(n_1+n_2-2)$$

$$T = \frac{(\overline{x}_1-\overline{x}_2)-(\mu_1-\mu_2)}{\sqrt{\frac{s_1^2}{n_1}+\frac{s_2^2}{n_2}}} \sim t(\text{Satt})$$

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

$$\text{Satt} = \frac{\left(\frac{s_1^2}{n_1}+\frac{s_2^2}{n_2}\right)^2}{\frac{1}{n_1-1}\left(\frac{s_1^2}{n_1}\right)^2+\frac{1}{n_2-1}\left(\frac{s_2^2}{n_2}\right)^2}$$

$$F = \frac{s_1^2}{s_2^2} \sim F(n_1-1, n_2-1)$$

$$Z = \frac{\widehat{\pi}-\pi_0}{\sqrt{\frac{\pi_0(1-\pi_0)}{n}}} \sim N(0,1)$$

$$Z = \frac{\widehat{\pi}_1-\widehat{\pi}_2}{\sqrt{\widehat{\pi}(1-\widehat{\pi})\left(\frac{1}{n_1}+\frac{1}{n_2}\right)}} \sim N(0,1)$$

$$\overline{x} \pm t^*_{\alpha/2,n-1}\frac{s}{\sqrt{n}}$$

$$(\overline{x}_1-\overline{x}_2) \pm t^*_{\alpha/2,n_1+n_2-2}s_p\sqrt{\frac{1}{n_1}+\frac{1}{n_2}}$$

$$\widehat{\pi} \pm z^*_{\alpha/2}\sqrt{\frac{\widehat{\pi}(1-\widehat{\pi})}{n}}$$

$$(\widehat{\pi}_1-\widehat{\pi}_2) \pm z^*_{\alpha/2}\sqrt{\frac{\widehat{\pi}_1(1-\widehat{\pi}_1)}{n_1}+\frac{\widehat{\pi}_2(1-\widehat{\pi}_2)}{n_2}}$$

$$\left(\frac{1}{F^*_{n_1-1,n_2-1,1-\alpha/2}}\frac{s_1^2}{s_2^2}, \frac{1}{F^*_{n_1-1,n_2-1,\alpha/2}}\frac{s_1^2}{s_2^2}\right)$$

$$(\overline{x}_1-\overline{x}_2) \pm t^*_{\alpha/2,\text{Satt}}\sqrt{\frac{s_1^2}{n_1}+\frac{s_2^2}{n_2}}$$

$$T = \frac{\overline{x}_{\text{DIFF}}-0}{\frac{s_{\text{DIFF}}}{\sqrt{n}}} \sim t(n-1)$$

$$\overline{x}_{\text{DIFF}} \pm t^*_{\alpha/2,n-1}\frac{s_{\text{DIFF}}}{\sqrt{n}}$$

$$r = \widehat{\rho} = \frac{\frac{1}{n-1}\sum_{i=1}^N(X_i-\overline{X})(Y_i-\overline{Y})}{\sqrt{\frac{1}{n-1}\sum_{i=1}^N(X_i-\overline{X})^2}\sqrt{\frac{1}{n-1}\sum_{i=1}^N(Y_i-\overline{Y})^2}} = \frac{S_{XY}}{S_XS_Y}$$

$$T = r\sqrt{\frac{N-2}{1-r^2}} \sim t(N-2)$$

$$\widehat{\rho} \sim N(\rho_0, 1/(N-3)) \text{ if } |\widehat{\rho}_0| < 0.55$$

$$F(\widehat{\rho}) \sim N(F(\rho_0), 1/(N-3)) \text{ if } |\widehat{\rho}_0| \geq 0.55$$

$$F(x) = \frac{1}{2}\log\left(\frac{1+x}{1-x}\right)$$

$$F^{-1}(x) = \frac{e^{2x}-1}{e^{2x}+1}$$

$$(n-1)S^2/\sigma_0^2 \sim \chi^2(n-1)$$

$$\left(\frac{(n-1)S^2}{\chi^2_{1-\alpha/2}}, \frac{(n-1)S^2}{\chi^2_{\alpha/2}}\right)$$