# *Formula Summary: Hypothesis Tests & Confidence Intervals*

| $H_o$ | | | Standard Error | Observed Stat | Test Stat | CI |
|---|---|---|---|---|---|---|
| $\mu_X - \mu_Y$ | Independent Groups | $\sigma_X$ & $\sigma_Y$ Known | $\sigma_{\bar{X}-\bar{Y}} = \sqrt{\frac{\sigma_X^2}{n_X} + \frac{\sigma_Y^2}{n_Y}}$ | $(\mu_X - \mu_Y)_{HYP} \pm z \times \sigma_{\bar{X}-\bar{Y}}$ | $z = \frac{(\bar{X}-\bar{Y}) - (\mu_X - \mu_Y)_{HYP}}{\sigma_{\bar{X}-\bar{Y}}}$ | $(\bar{X}-\bar{Y}) \pm z \times \sigma_{\bar{X}-\bar{Y}}$ |
| | | $\sigma_X$ & $\sigma_Y$ Unknown | $\hat{\sigma}_{\bar{X}-\bar{Y}} = \sqrt{\frac{n_X S_X^2 + n_Y S_Y^2}{n_X + n_Y - 2}\left(\frac{1}{n_X} + \frac{1}{n_Y}\right)}$ | $(\mu_X - \mu_Y)_{HYP} \pm t \times \hat{\sigma}_{\bar{X}-\bar{Y}}$ | $t = \frac{(\bar{X}-\bar{Y}) - (\mu_X - \mu_Y)_{HYP}}{\hat{\sigma}_{\bar{X}-\bar{Y}}}$<br>$df = n_X + n_Y - 2$ | $(\bar{X}-\bar{Y}) \pm t \times \hat{\sigma}_{\bar{X}-\bar{Y}}$ |
| | Dependent Groups | Easy Way | $\hat{\sigma}_{\bar{D}} = \frac{S_D}{\sqrt{n-1}}$ | $(\mu_D)_{HYP} \pm t \times \hat{\sigma}_{\bar{D}}$ | $t = \frac{\bar{D} - (\mu_D)_{HYP}}{\hat{\sigma}_{\bar{D}}}$<br>$df = n - 1$ | $\bar{D} \pm t \times \hat{\sigma}_{\bar{D}}$ |
| | | Hard Way | $\hat{\sigma}_{\bar{X}-\bar{Y}} = \sqrt{\frac{S_X^2}{n_X - 1} + \frac{S_Y^2}{n_Y - 1} - 2r\frac{S_X}{\sqrt{n_X - 1}} \cdot \frac{S_Y}{\sqrt{n_Y - 1}}}$ | | | |
| $\rho = 0$ | | | | | $t = \frac{r\sqrt{n-2}}{\sqrt{1-r^2}}$<br>$df = n - 2$ | |
| $\rho$ = constant (not 0) | | | $\hat{\sigma}_{z'} = \sqrt{\frac{1}{n-3}} = \frac{1}{\sqrt{n-3}}$ | | $z = \frac{z' - z'_o}{\sqrt{\frac{1}{n-3}}}$ | $z' \pm z \times \sqrt{\frac{1}{n-3}}$ |