

# Confidence Interval for the difference between two means

$$\mu_1 - \mu_2$$

$\sigma_1^2$  &  $\sigma_2^2$  Known

$\sigma_1^2 = \sigma_2^2 = \sigma^2$   
Unknown but equal

$$\bar{X}_1 - \bar{X}_2 \pm Z_{1-\frac{\alpha}{2}} \sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}$$

$$\bar{X}_1 - \bar{X}_2 \pm t_{\frac{\alpha}{2}, n_1+n_2-2} S_p \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}$$

$$S_p = \sqrt{\frac{(n_1 - 1)S_1^2 + (n_2 - 1)S_2^2}{n_1 + n_2 - 2}}$$