

- Exact confidence interval for a normal mean μ when $\sigma^2 = \sigma_0^2$ is known:

$$\bar{Y} \pm z_{\alpha/2} \left(\frac{\sigma_0}{\sqrt{n}} \right)$$

- Large-sample confidence interval for a population mean μ :

$$\bar{Y} \pm z_{\alpha/2} \left(\frac{S}{\sqrt{n}} \right)$$

- Large-sample confidence interval for a population proportion p :

$$\hat{p} \pm z_{\alpha/2} \sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$$

- Large-sample confidence interval for the difference of two population means $\mu_1 - \mu_2$:

$$(\bar{Y}_{1+} - \bar{Y}_{2+}) \pm z_{\alpha/2} \sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}}$$

- Large-sample confidence interval for the difference of two population proportions $p_1 - p_2$:

$$(\hat{p}_1 - \hat{p}_2) \pm z_{\alpha/2} \sqrt{\frac{\hat{p}_1(1-\hat{p}_1)}{n_1} + \frac{\hat{p}_2(1-\hat{p}_2)}{n_2}}$$

- Small-sample confidence interval for a normal mean μ :

$$\bar{Y} \pm t_{n-1, \alpha/2} \left(\frac{S}{\sqrt{n}} \right)$$

- Small-sample confidence interval for the difference of two normal means $\mu_1 - \mu_2$ when $\sigma_1^2 = \sigma_2^2$ (equal population variances):

$$(\bar{Y}_{1+} - \bar{Y}_{2+}) \pm t_{n_1+n_2-2, \alpha/2} S_p \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}$$

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

- Small-sample approximate confidence interval for the difference of two normal means $\mu_1 - \mu_2$ when $\sigma_1^2 \neq \sigma_2^2$ (unequal population variances):

$$(\bar{Y}_{1+} - \bar{Y}_{2+}) \pm t_{\nu, \alpha/2} \sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}}$$

$$\nu \approx \frac{\left(\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}\right)^2}{\frac{\left(\frac{S_1^2}{n_1}\right)^2}{n_1-1} + \frac{\left(\frac{S_2^2}{n_2}\right)^2}{n_2-1}}$$

- Exact confidence interval for a normal variance σ^2 :

$$\left[\frac{(n-1)S^2}{\chi_{n-1, \alpha/2}^2}, \frac{(n-1)S^2}{\chi_{n-1, 1-\alpha/2}^2} \right]$$

- Exact confidence interval for the ratio of two normal variances σ_2^2/σ_1^2 :

$$\left(\frac{S_2^2}{S_1^2} \times F_{n_1-1, n_2-1, 1-\alpha/2}, \frac{S_2^2}{S_1^2} \times F_{n_1-1, n_2-1, \alpha/2} \right)$$