Table 10-5 Summary of Confidence Interval Procedures

Problem Type	Point Estimator	Two-Sided $100(1-\alpha)\%$ Confidence Interval
Mean μ of a normal distribution, variance σ^2 known	$\overline{X}$	$\overline{X} - Z_{\alpha/2}\,\sigma/\sqrt{n} \le \mu \le \overline{X} + Z_{\alpha/2}\,\sigma/\sqrt{n}$
Difference in means of two normal distributions μ_1 and μ_2, variances σ_1^2 and σ_2^2 known	$\overline{X}_1 - \overline{X}_2$	$\overline{X}_1 - \overline{X}_2 - Z_{\alpha/2}\sqrt{\frac{\sigma_1^2}{n_1}+\frac{\sigma_2^2}{n_2}} \le \mu_1 - \mu_2 \le \overline{X}_1 - \overline{X}_2 + Z_{\alpha/2}\sqrt{\frac{\sigma_1^2}{n_1}+\frac{\sigma_2^2}{n_2}}$
Mean μ of a normal distribution, variance σ^2 unknown	$\overline{X}$	$\overline{X} - t_{\alpha/2,n-1}\,S/\sqrt{n} \le \mu \le \overline{X} + t_{\alpha/2,n-1}\,S/\sqrt{n}$
Difference in means of two normal distributions $\mu_1 - \mu_2$, variance $\sigma_1^2 = \sigma_2^2$ unknown	$\overline{X}_1 - \overline{X}_2$	$\overline{X}_1 - \overline{X}_2 - t_{\alpha/2,n_1+n_2-2}S_p\sqrt{\frac{1}{n_1}+\frac{1}{n_2}} \le \mu_1 - \mu_2 \le \overline{X}_1 - \overline{X}_2 + t_{\alpha/2,n_1+n_2-2}S_p\sqrt{\frac{1}{n_1}+\frac{1}{n_2}}$, where $S_p = \sqrt{\frac{(n_1-1)S_1^2+(n_2-1)S_2^2}{n_1+n_2-2}}$
Difference in means of two normal distributions for paired samples $\mu_D = \mu_1 - \mu_2$	$\overline{D}$	$\overline{D} - t_{\alpha/2,n-1}\,S_D/\sqrt{n} \le \mu_D \le \overline{D} + t_{\alpha/2,n-1}\,S_D/\sqrt{n}$
Variance σ^2 of a normal distribution	S^2	$\frac{(n-1)S^2}{\chi^2_{\alpha/2,n-1}} \le \sigma^2 \le \frac{(n-1)S^2}{\chi^2_{1-\alpha/2,n-1}}$
Ratio of the variances σ_1^2/σ_2^2 of two normal distributions	$\frac{S_1^2}{S_2^2}$	$\frac{S_1^2}{S_2^2}F_{1-\alpha/2,n_2-1,n_1-1} \le \frac{\sigma_1^2}{\sigma_2^2} \le \frac{S_1^2}{S_2^2}F_{\alpha/2,n_2-1,n_1-1}$
Proportion or parameter of a binomial distribution p	$\hat{p}$	$\hat{p} - Z_{\alpha/2}\sqrt{\frac{\hat{p}(1-\hat{p})}{n}} \le p \le \hat{p} + Z_{\alpha/2}\sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$
Difference in two proportions or two binomial parameters $p_1 - p_2$	$\hat{p}_1 - \hat{p}_2$	$\hat{p}_1 - \hat{p}_2 - Z_{\alpha/2}\sqrt{\frac{\hat{p}_1(1-\hat{p}_1)}{n_1}+\frac{\hat{p}_2(1-\hat{p}_2)}{n_2}} \le p_1 - p_2 \le \hat{p}_1 - \hat{p}_2 + Z_{\alpha/2}\sqrt{\frac{\hat{p}_1(1-\hat{p}_1)}{n_1}+\frac{\hat{p}_2(1-\hat{p}_2)}{n_2}}$