Table 4. Probability and Statistics Formulas (Continued)

Confidence Intervals

Parameter	Assumptions	$100(1-\alpha)\%$ Confidence Interval
μ	n large, σ^2 known, or normality, σ^2 known	$\overline{x} \pm z_{\alpha/2} \cdot \frac{\sigma}{\sqrt{n}}$
μ	n large, σ^2 unknown	$\overline{x} \pm z_{\alpha/2} \cdot \frac{s}{\sqrt{n}}$
μ	normality, n small, σ^2 unknown	$\overline{x} \pm t_{\alpha/2,n-1} \cdot \frac{s}{\sqrt{n}}$
p	binomial experiment, n large	$\hat{p} \pm z_{\alpha/2} \cdot \sqrt{\frac{\hat{p}\hat{q}}{n}}$
σ^2	normality	$\left(\frac{(n-1)s^2}{\chi^2_{\alpha/2,n-1}}, \frac{(n-1)s^2}{\chi^2_{1-\alpha/2,n-1}}\right)$
$\mu_1 - \mu_2$	n_1, n_2 large, independence, σ_1^2, σ_2^2 known, or normality, independence, σ_1^2, σ_2^2 known	$(\overline{x}_1 - \overline{x}_2) \pm z_{\alpha/2} \cdot \sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}$
$\mu_1 - \mu_2$	n_1, n_2 large, independence, σ_1^2, σ_2^2 unknown	$(\overline{x}_1 - \overline{x}_2) \pm z_{\alpha/2} \cdot \sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}$
$\mu_1 - \mu_2$	normality, independence, σ_1^2, σ_2^2 unknown but equal, n_1, n_2 small	$(\overline{x}_1 - \overline{x}_2) \pm t_{\alpha/2,n_1+n_2-2} \cdot s_p\sqrt{\frac{1}{n_1} + \frac{1}{n_2}}$ $s_p = \frac{(n_1-1)s_1^2 + (n_2-1)s_2^2}{n_1+n_2-2}$
$\mu_1 - \mu_2$	normality, independence, σ_1^2, σ_2^2 unknown, unequal, n_1, n_2 small	$(\overline{x}_1 - \overline{x}_2) \pm t_{\alpha/2,\nu} \cdot \sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}$ $\nu = \frac{\left(\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}\right)^2}{\frac{(s_1^2/n_1)^2}{n_1-1} + \frac{(s_2^2/n_2)^2}{n_2-1}}$
$\mu_D = \mu_1 - \mu_2$	normality, n pairs, n small, dependence	$\overline{d} \pm t_{\alpha/2,n-1} \cdot \frac{s_D}{\sqrt{n}}$
$p_1 - p_2$	binomial experiments, n_1, n_2 large, independence	$(\hat{p}_1 - \hat{p}_2) \pm z_{\alpha/2} \cdot \sqrt{\frac{\hat{p}_1\hat{q}_1}{n_1} + \frac{\hat{p}_2\hat{q}_2}{n_2}}$
$\frac{\sigma_1^2}{\sigma_2^2}$	normality, independence	$\left(\frac{s_1^2}{s_2^2} \cdot \frac{1}{F_{\frac{\alpha}{2},n_1-1,n_2-1}}, \frac{s_1^2}{s_2^2} \cdot \frac{1}{F_{1-\frac{\alpha}{2},n_1-1,n_2-1}}\right)$