Critical Values.

$X \sim N(\mu, \sigma^2)$

$Z \sim N(0,1)$

$\bar{X} \pm \underset{\underset{\text{value}}{\downarrow \text{Critical}}}{Z_{\alpha/2}} \underset{\underset{\uparrow \text{sample size}}{}}{\sigma/\sqrt{n}}$, pop SD

$n > 30$

$\bar{X} \pm \underset{\underset{\text{value}}{\downarrow \text{critical}}}{Z_{\alpha/2}} \underset{\underset{\uparrow \text{sample size}}{}}{S/\sqrt{n}}$, Sample SD

Sample mean

Sample mean

$n < 30$ $\qquad$ $X \sim N(\mu, \sigma^2)$ $\quad$ σ^2 unknown

$$\bar{X} \pm t_{\alpha/2, \, n-1} \; S/\sqrt{n} \; \rightarrow \; (1-\alpha)100\% \; CI$$
$$\text{of } \mu$$

95% CI $\qquad$ $\alpha = 0.05$ $\qquad$ $n = 14$

$t_{0.025, \, 13} = 2.16$

90% CI $\qquad$ $n = 23$

$t_{\alpha/2, \, DF} = 1.717$

$t_{0.05, \, 33}$

$(1-\alpha)100\%$ CI of σ^2

$$\left(\frac{(n-1)S^2}{\chi^2_{n-1,\,\alpha/2}} \,,\, \frac{(n-1)S^2}{\chi^2_{n-1,\,1-\alpha/2}} \right)$$

$$X \sim N(\mu, \sigma^2)$$

95% $\qquad$ $\alpha = 0.05$ $\qquad$ $n = 25$

$\chi^2_{24,\,0.025}$ $\qquad\qquad$ $\chi^2_{24,\,0.975}$

39.364 $\qquad\qquad\qquad$ 12.41