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STA2023: Test 4 formulas

Confidence Intervals:

a. if σ, population standard deviation is known:

$$\bar{x} \pm z_{\alpha/2} \cdot \frac{\sigma}{\sqrt{n}}$$

b. If population standard deviation σ, unknown, use the sample standard deviation (for a normal distributed variable), and the $t\ distribution$:

$$\bar{x} \pm t_{\alpha/2} \cdot \frac{s}{\sqrt{n}}$$

For t critical values, see t-table.

c. Confidence Interval for the population proportion:

$$\hat{p} \pm z_{\alpha/2} \cdot \sqrt{\frac{\hat{p} \cdot \hat{q}}{n}} \qquad \text{where} \quad \hat{q} = 1 - \hat{p}$$

Sample size:

Sample size for means:	Sample size por proportions:
$n = \left(\frac{z_{\alpha/2} \cdot \sigma}{E}\right)^2$	$n = \hat{p} \cdot \hat{q} \left(\frac{z_{\alpha/2}}{E}\right)^2$ If $\hat{p}$ unknown, use 0.5

Critical Values:

90%, $Z_{\alpha/2} = 1.645$ || 95%, $Z_{\alpha/2} = 1.960$ || 98%, $Z_{\alpha/2} = 2.326$ || 99%, $Z_{\alpha/2} = 2.576$

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Hypothesis Testing:

Test Statistics:

1. One mean, sigma known:

$$z = \frac{\bar{x} - \mu}{\frac{\sigma}{\sqrt{n}}}$$

2. One mean, sigma unknown:

$$t = \frac{\bar{x} - \mu}{\frac{s}{\sqrt{n}}}$$

3. One proportion:

$$Z = \frac{\hat{p} - p}{\sqrt{\frac{p \cdot q}{n}}}$$