9.2 Tests about a Population Proportion

H: State the hypotheses \( H_0 \) and \( H_a \)

\[ H_0: \hat{p} = p_0 \]

A: Check the assumptions/conditions:

- Random sample
- \( n \leq 10\% \) of population
- \( np_0 \geq 10 \) and \( n(1-p_0) \geq 10 \)

Sampling dist. is approx. Normal

M: Do some math and calculate a \( P \)-value using test statistic (\( \hat{p} \) turned into a \( Z \))

Standardized test statistic = \( Z = \frac{\text{Statistic} - \text{Parameter}}{\text{Std dev of statistic}} \)

\[ Z = \frac{\hat{p} - p_0}{\sigma_{\hat{p}}} = \frac{\hat{p} - p_0}{\sqrt{\frac{p_0(1-p_0)}{n}}} \]

\( P \)-value \*To calculate \( P \)-value, \( = \text{normalcdf}(\) \( \) \( ) \)

C: Conclude whether to Reject \( H_0 \)

(in favor of \( H_a \)) or Fail to reject \( H_0 \)

with Context

If \( P \)-value is low \( (P<\alpha) \), Reject \( H_0 \).

If not \( (P>\alpha) \), Fail to Reject \( H_0 \).
9.3 Tests about a Population Mean

H: State the hypotheses \( H_0 \) and \( H_a \)
\( H_0: \mu = \mu_0 \)

A: Check the assumptions/conditions:
- Random sample
- \( n \leq 10\% \) of population
- \( n \geq 30 \) or population distribution is approx. normal
- Sample size is not strongly skewed with no outliers

M: Do some math and calculate a p-value using test statistic (\( \bar{x} \) turned into a \( t \))

\[
\text{test statistic} = t = \frac{\text{Statistic} - \text{Parameter}}{\text{std dev of statistic}}
\]

\[
t = \frac{\bar{x} - \mu_0}{\frac{S_x}{\sqrt{n}}}
\]

\# If \( \sigma \) is known... use \( Z \) instead of \( t \) (very rare)

\*To calculate p-value, \( p \)-value = \( tcdf( \) __)

C: Conclude whether to Reject \( H_0 \)
(in favor of \( H_a \)) or Fail to reject \( H_0 \)

With Context
- If \( p \)-value is low (\( P < \alpha \)), Reject \( H_0 \).
- If not (\( P > \alpha \)), Fail to Reject \( H_0 \).