Section 8-3

Testing a Claim About a Proportion

Assumptions for Testing Claims About a Population Proportion \( p \)

1) The sample observations are a simple random sample.
2) The conditions for a binomial experiment are satisfied (Section 5-3)
3) The conditions \( np \geq 5 \) and \( nq \geq 5 \) are satisfied, so the binomial distribution of sample proportions can be approximated by a normal distribution with \( \mu = np \) and \( \sigma = \sqrt{npq} \).

Notation

\( n = \text{number of trials} \)
\( \hat{p} = \frac{x}{n} \text{ (sample proportion)} \)
\( p = \text{population proportion (used in the null hypothesis)} \)
\( q = 1 - p \)
Test Statistic for Testing a Claim about a Proportion

\[ Z = \frac{\hat{p} - p}{\sqrt{\frac{pq}{n}}} \]

\( \hat{p} \) sometimes is given directly

“10% of the observed sports cars are red”

is expressed as

\[ \hat{p} = 0.10 \]

\( \hat{p} \) sometimes must be calculated

“96 surveyed households have cable TV and 54 do not” is calculated using

\[ \hat{p} = \frac{x}{n} = \frac{96}{(96+54)} = 0.64 \]

(determining the sample proportion of households with cable TV)