Chapter 19

TESTING HYPOTHESES ABOUT PROPORTIONS

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HYPOTHESES

- An hypothesis is a claim or statement about an attribute of a population.
- The null hypothesis is the statement that there is nothing happening
  - Notation: H_0 = null hypothesis statement
- The alternative hypothesis is a statement that something is happening
  - Notation: H_A = alternative hypothesis statement

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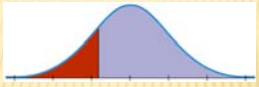
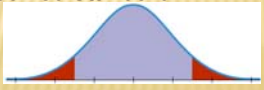
HYPOTHESIS TESTING

- In a one-tailed hypothesis test, the alternative hypothesis specifies a single direction



- In a two-tailed hypothesis test, the alternative hypothesis includes values in either direction from a specified standard



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HYPOTHESIS TESTING

- When hypothesis testing, we are answering the question: "If the null hypothesis is true about the population, what is the probability of observing sample data like that observed?"
- Based on our answer, we either reject or fail to reject the null hypothesis

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HYPOTHESIS TESTING

- A test statistic is a data summary that we use to evaluate the two hypotheses
- The P-value is computed by assuming the null hypothesis is true and then determining the probability of a result as extreme (or more extreme) as the observed test statistic in the direction of the alternative hypothesis.
- The level of significance is the predetermined probability cutoff we use
  - Notation: α = level of significance

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TESTING HYPOTHESES ABOUT A PROPORTION

- The three possible choices for hypotheses are:
  1. $H_0: p=p_0$, $H_A: p \neq p_0$
  2. $H_0: p \geq p_0$, $H_A: p<p_0$
  3. $H_0: p \leq p_0$, $H_A: p>p_0$
- p_0 is the null value

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ONE-PROPORTION Z-TEST

- The conditions for the one-proportion *z*-test are the same as for the one proportion *z*-interval. We test the hypothesis

$H_0: p = p_0$

using the statistic

$$z = \frac{(\hat{p} - p_0)}{SD(\hat{p})}$$

where $SD(\hat{p}) = \sqrt{\frac{p_0 q_0}{n}}$

- When the conditions are met and the null hypothesis is true, this statistic follows the standard Normal model, so we can use that model to obtain a P-value.

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