

# Chapter 9

## Hypothesis Testing

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**Despite the surge protector,  
Marty still shorted out on too much coffee.**

### Outline

- ✓ Developing Null and Alternative Hypotheses
- ✓ Type I and Type II Errors
- ✓ Tests About a Population Mean:
  - Large-Sample Case
- ✓ Tests About a Population Mean:
  - Small-Sample Case
- ✓ Tests About a Population Proportion
- ✓ Hypothesis Testing and Decision Making
- ✓ Calculating the Probability of Type II Errors
- ✓ Determining the Sample Size for a Hypothesis Test About a Population Mean



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### Developing Null and Alternative Hypotheses

- ✓ **Hypothesis testing** can be used to determine whether a statement about the value of a population parameter should or should not be rejected.
- ✓ The **null hypothesis**, denoted by  $H_0$ , is a tentative assumption about a population parameter.
- ✓ The **alternative hypothesis**, denoted by  $H_a$ , is the opposite of what is stated in the null hypothesis.
- ✓ Hypothesis testing is similar to a criminal trial. The hypotheses are:
  - $H_0$ : The defendant is not guilty
  - $H_a$ : The defendant is guilty

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Developing Null and Alternative Hypotheses

- ✓ Testing Research Hypotheses
  - The research hypothesis should be expressed as the alternative hypothesis.
  - The conclusion that the research hypothesis is true comes from sample data that contradict the null hypothesis.
- ✓ Testing the Validity of a Claim
  - Manufacturers' claims are usually given the benefit of the doubt and stated as the null hypothesis.
  - The conclusion that the claim is false comes from sample data that contradict the null hypothesis.

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Developing Null and Alternative Hypotheses

- ✓ Testing in Decision-Making Situations
  - A decision maker might have to choose between two courses of action, one associated with the null hypothesis and another associated with the alternative hypothesis.
  - Example: Accepting a shipment of goods from a supplier or returning the shipment of goods to the supplier.

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A Summary of Forms for Null and Alternative Hypotheses about a Population Mean and Population Proportion

- ✓ The equality part of the hypotheses **always** appears in the null hypothesis.
- ✓ In general, a hypothesis test about the value of a population mean  $\mu$  or population proportion  $p$  must take one of the following three forms, where:
  - $\mu_0$  is the hypothesized value of the population mean
  - $p_0$  is the hypothesized value of the population proportion.

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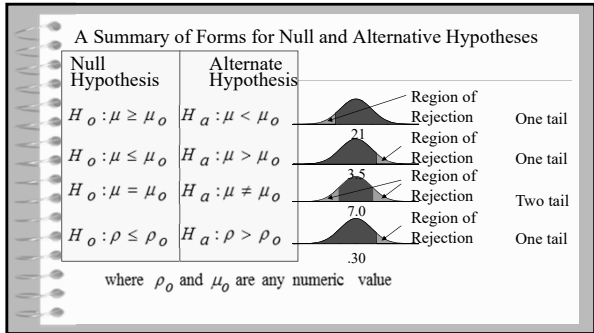
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