8-1 Review and Preview

By providing methods for estimating values of population parameters using confidence intervals, Chapter 7 introduced one of the two main activities of inferential statistics. This chapter introduces the second major activity of inferential statistics: Testing claims made about population parameters.

The main objective of this chapter is to develop the ability to conduct hypothesis tests for claims made about a population proportion p, a population mean μ, or a population standard deviation σ. Here are examples of hypotheses that can be tested by the procedures in this chapter:

- **Law:** Republicans claimed in a lawsuit that a New Jersey county clerk did not use a required method of random selection when he chose a Democratic candidate to be first on the ballot in 40 out of 41 elections.
- **Genetics:** The Genetics & IVF Institute claims that its XSORT method allows couples to increase the probability of having a baby girl, and sample evidence consists of 879 girls among 945 couples treated with the XSORT method.
- **Health:** It is often claimed that the mean body temperature is 98.6°F, and we can test that claim using Data Set 3 in Appendix B, which includes a sample of 106 body temperatures with a mean of 98.2°F.
- **Business:** A newspaper cites a PriceGrabber.com survey of 1631 subjects and claims that the majority of consumers have heard of the Kindle as an e-book reader.
- **Quality Control:** When new equipment is used to manufacture aircraft altimeters, the new altimeters are better because the variation in the errors is reduced so that the readings are more consistent. (In many industries, the quality of goods and services can often be improved by reducing variation.)

8-2 Basics of Hypothesis Testing

Key Concept In this section we present the general components of a formal hypothesis test. In Part 1 we discuss the basic concepts of hypothesis testing. Because these concepts are used in the following sections and chapters, we should be able to do the following:

- Identify the null hypothesis and alternative hypothesis from a given claim, and express both in symbolic form.
- Calculate the value of the test statistic, given a claim and sample data.
- Choose the sampling distribution that is relevant.
- Either find the *P*-value or identify the critical value(s).
- State the conclusion about a claim in simple and nontechnical terms.

In Part 2 we describe the *power* of a hypothesis test.

Part 1: Basic Concepts of Hypothesis Testing

Because hypothesis testing is the main focus of this chapter, we begin with two very basic definitions.

DEFINITIONS

In statistics, a **hypothesis** is a claim or statement about a property of a population.

A **hypothesis test** (or **test of significance**) is a procedure for testing a claim about a property of a population.