9-1   Review and Preview

Inferential statistics involves forming conclusions (or inferences) about a population parameter. Two major activities of inferential statistics are (1) estimating values of population parameters using confidence intervals, and (2) testing claims made about population parameters. Chapter 7 introduced methods for constructing confidence interval estimates of a population proportion, population mean, or a population standard deviation or variance. Chapter 8 introduced methods for testing claims about a population proportion, population mean, or population standard deviation or variance. Chapters 7 and 8 both involved methods for dealing with a sample from *one* population. The objective of this chapter is to extend the methods for *estimating* values of population parameters and the methods for *testing hypotheses* to situations involving *two* populations. The following are examples typical of those found in this chapter.

- Test the claim that when people in one group are each given four quarters while people in another group are each given a $1 bill, the group given the $1 bill is less likely to spend the money.

- Test the claim that the proportion of children who contract polio is less for children given the Salk vaccine than for children given a placebo.

- Test the claim that the mean body temperature of men is different from the mean body temperature of women.

Because there are so many studies involving a comparison of *two* samples, the methods of this chapter are very important because they apply to a wide variety of real applications.

9-2   Two Proportions

Key Concept In this section we present methods for (1) testing a claim made about two population proportions and (2) constructing a confidence interval estimate of the difference between two population proportions. Although the focus of this section is proportions, we can use the same methods for dealing with probabilities or the decimal equivalents of percentages.

Objectives

(1) Test a claim about two population proportions or (2) construct a confidence interval estimate of the difference between two population proportions.

Notation for Two Proportions

For population 1 we let

p_1 = *population* proportion

n_1 = size of the sample

x_1 = number of successes in the sample

$\hat{p}_1 = \dfrac{x_1}{n_1}$ (*sample* proportion)

$\hat{q}_1 = 1 - \hat{p}_1$ (complement of $\hat{p}_1$)

The corresponding notations $p_2, n_2, x_2, \hat{p}_2$, and $\hat{q}_2$ apply to population 2.