1.2 Exercises

Basic Concepts

1. What is a population?
2. What is a frame?
3. What is a population parameter?
4. What is a sample?
5. What is a statistic?
6. What is the difference between a population parameter and a statistic?
7. Describe the relationships between populations, samples, parameters, and statistics.
8. For a given specific population frame, is the value of a specific parameter variable? Should we expect the value of a sample statistic to vary? Why or why not?

Exercises

9. A heart researcher is interested in studying the relationship between diets which are high in calcium and blood pressure in adult females. The researcher randomly selects 20 female subjects who have high blood pressure. Ten subjects are randomly assigned to try a diet which is high in calcium. The other subjects are assigned to a diet with a standard amount of calcium. After one year the average blood pressures for subjects in both groups will be measured and compared to decide if diets high in calcium decrease the average blood pressure.
   a. Identify the population.
   b. What characteristic of the population is being measured?
   c. Identify the sample.

10. A center for drug abuse is conducting a study to determine if heroin usage among teenagers has changed. Historically, they have found that about 1.3 percent of teenagers between the ages of 15 and 19 have used heroin one or more times. In a survey of 1824 teenagers, 37 indicated they had used heroin one or more times.
    a. Identify the population.
    b. What characteristic of the population is being measured?
    c. Identify the sample.

11. Heavy episodic or binge drinking is a serious problem in colleges and universities in the United States. A study reported in *The Journal of the American Medical Association* (JAMA) surveyed a total of 17,592 students selected from 140 US 4-year colleges in order to examine the extent of binge drinking.[11] The study found that 44% of the students surveyed admitted to being binge drinkers. A binge drinker was defined as consuming five or more drinks in a row for men and four or more drinks in a row for women during the two weeks prior to the survey.
    a. Identify the population.
    b. What characteristic of the population is being measured?
    c. Identify the sample.
    d. What are some problems associated with collecting the type of data described in this problem?

12. A nurse is interested in the growth curve of boys from infancy to the age of 18. One thousand boys are randomly selected, and their heights are measured at various intervals from birth until the age of 18. Based on these measurements, growth curves are constructed based on the percentage of heights observed to be at or below a certain height at each interval (this population characteristic is called a percentile and will be discussed in Chapter 4).

a. Identify the population.

b. What characteristic of the population is being measured?

c. Identify the sample.

13. A personnel director is interested in determining how effective a new reading course will be in improving the reading comprehension of her company's employees. The director randomly selects twenty employees and determines the average reading comprehension both before and after instruction in the reading course.

a. Identify the population.

b. What characteristic of the population is being measured?

c. Identify the sample.

14. A predominance of body fat, adiposity, can be associated with a myriad of human illnesses including hypertension, diabetes, stroke, heart disease, gallbladder disease, and breast cancer. A standard measure of overall adiposity is the Quetelet index, which is defined as the weight (kg) divided by the square of the height (m). In a study in the *American Journal of Epidemiology*, the Quetelet index was measured on a sample of women between the ages of 35–65 years visiting a breast screening clinic in New York City. The average value of the Quetelet index computed for the women sampled was 25.2. Assume that one of the goals of the study is to estimate the average Quetelet index for all women attending the breast screening clinic.

a. Identify the population.

b. What characteristic of the population is being measured?

c. Identify the sample.

d. What is the unknown population parameter in this problem?

e. What is the estimate of this parameter?

1.3 Descriptive versus Inferential Statistics

The science of statistics is divided into two categories, **descriptive** and **inferential**. Descriptive methods describe and summarize data and are used as a method of discovery. Inferential methods aid in making decisions and predictions about population parameters and processes for which it is impractical to obtain measurements on all population members.