## Concept/Writing Exercises

1. Define *statistics* in your own words.

2. Explain the difference between descriptive and inferential statistics.

3. When you hear the word *statistics*, what specific words or ideas come to mind?

4. Attempt to list at least two professions in which no aspect of statistics is used.

5. Name five areas other than those mentioned in this section in which statistics is used.

6. Explain the difference between probability and statistics.

7. a) What is a population?
   b) What is a sample?

8. a) What is a systematic sample?
   b) How might a systematic sample be selected?

9. a) What is a random sample?
   b) How might a random sample be selected?

10. a) What is a cluster sample?
    b) How might a cluster sample be selected?

11. a) What is a stratified sample?
    b) How might a stratified sample be selected?

12. a) What is a convenience sample?
    b) How might a convenience sample be selected?

13. What is an unbiased sample?

14. *Family Size* The principal of an elementary school wishes to determine the "average" family size of the children who attend the school. To obtain a sample, the principal visits each room and selects the four students closest to each corner of the room. The principal asks each of these students how many people are in his or her family.
    a) Will this technique result in an unbiased sample? Explain your answer.
    b) If the sample is biased, will the average be greater than or less than the true family size? Explain.

Practice the Skills

Sampling Techniques In Exercises 15–24, identify the sampling technique used to obtain a sample. Explain your answer.

15. A group of people are classified according to age and then random samples of people from each group are taken. Stratified

16. Every 15th CD player coming off an assembly line is checked for defects. Systematic

17. A state is divided into regions using zip codes. A random sample of 20 zip code areas is selected. Cluster

18. A door prize is given away at a teachers' convention. Tickets are placed in a bin and the tickets are mixed up. Then a ticket is selected by a blindfolded person. Random

19. Every 17th person in line to buy tickets for a rock concert is asked his or her age. Systematic

20. The businesses in Iowa City are grouped according to type: medical, service, retail, manufacturing, financial, construction, restaurant, hotel, tourism, and other. A random sample of 10 businesses from each type is selected. Stratified

21. The first 25 students leaving the cafeteria are asked how much money they spent on textbooks for the semester. convenience

22. The Food and Drug Administration randomly selects five stores from each of four randomly selected sections of a large city and checks food items for freshness. These stores are used as a representative sample of the entire city. Cluster

23. Bingo balls in a bin are shaken and then balls are selected from the bin. random
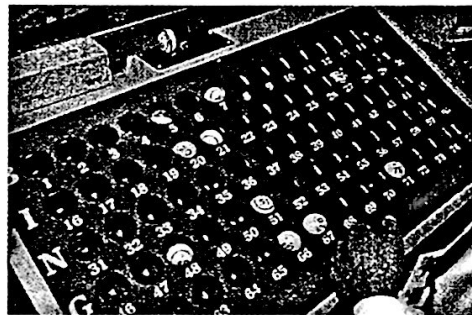
24. The Student Senate at the University of New Orleans is electing a new president. The first 25 people leaving the library are asked for whom they will vote. convenience

Challenge Problems/Group Activities

25. a) *Random Sampling* Select a topic and population of interest to which a random sampling technique can be applied to obtain data.
    b) Explain how you or your group would obtain a random sample for your population of interest.
    c) Actually obtain the sample by the procedure stated in part (b).

26. *Data from Questionnaire* Some subscribers of *Consumer Reports* respond to an annual questionnaire regarding their satisfaction with new appliances, cars, and other items. The information obtained from these questionnaires is then used as a sample from which frequency of repairs and other ratings are made by the magazine. Are the data obtained from these returned questionnaires representative of the entire population or are they biased? Explain your answer.

CHAPTER 13 TEST

In Exercises 1–6, for the set of data 21, 37, 37, 39, 46, determine the

1. mean. 36
2. median. 37
3. mode. 37
4. midrange. 33.5
5. range. 25
6. standard deviation.

$\sqrt{84} = 9.17$

In Exercises 7–9, use the set of data

26	28	35	46	49	56
26	30	36	46	49	58
26	32	40	47	50	58
26	32	44	47	52	62.
27	35	46	47	54	66

to construct

7. a frequency distribution; let the first class be 25–30.
8. a histogram of the frequency distribution.
9. a frequency polygon of the frequency distribution.

Statistics on Salaries In Exercises 10–16, use the following data on weekly salaries at Maxwell Mechanical Contractors.

Mean	$700	First quartile	$650
Median	$670	Third quartile	$705
Mode	$695	79th percentile	$712
Standard deviation	$40		

10. What is the most common salary? $695
11. What salary did half the employees exceed? $670
12. About what percent of employees' salaries exceeded $650? 75%
13. About what percent of employees' salaries was less than $712? 79%
14. If the company has 100 employees, what is the total weekly salary of all employees? $70,000
15. What salary represents one standard deviation above the mean? $740
16. What salary represents 1.5 standard deviations below the mean? $640

Mileage of 5-Year-Old Cars In Exercises 17–20, the mileage of 5-year-old cars is normally distributed with a mean of 75,000 and a standard deviation of 12,000 miles.

17. What percent of 5-year-old cars have mileage between 50,000 and 70,000 miles? 31.8%
18. What percent of 5-year-old cars have mileage greater than 60,000 miles? 89.4%
19. What percent of 5-year-old cars have mileage greater than 90,000 miles? 10.6%
20. If a random sample of 300 five-year-old cars is selected, how many would have mileage between 60,000 and 70,000 miles? 69 cars
21. *The Elderly U.S. Population* The following chart shows the percent of the U.S. population that was age 65 and over for the years 1970, 1980, 1990, 1995, and 2000, where the column labeled Year refers to the number of years since 1970.

Percent of U.S. Population Age 65 and Over

Year	Percent
0	9.8
10	11.3
20	12.5
25	12.8
30	12.4

Source: U.S. Bureau of the Census, U.S. Dept. of Commerce.

a) Construct a scatter diagram placing the year on the horizontal axis.
b) Use the scatter diagram in part (a) to determine whether you believe that a correlation exists between the year and the percent of the U.S. population age 65 and over. Explain.
c) Determine the correlation coefficient between the year and the percent of the U.S. population age 65 and over.
d) Determine whether a correlation exists at $\alpha = 0.05$.
e) Assuming that this trend continues, determine the equation of the line of best fit between the year and the percent of the U.S. population age 65 and over.
f) Use the equation in part (e) to predict the percent of the U.S. population age 65 and over in 2010, or 40 years after 1970.