4.19 Calculate the variance of the following data.
9 3 7 4 1 7 5 4

4.20 Calculate the variance of the following data.
4 5 3 6 5 6 6

4.21 Determine the variance and standard deviation of the following sample.
12 6 22 31 13 15 17 21

4.22 Find the variance and standard deviation of the following sample.
0 5 3 6 4 -4 1 -5 0 3

4.23 Examine the three samples listed here. Without performing any calculations, indicate which sample has the largest amount of variation and which sample has the smallest amount of variation. Explain how you produced your answer.

- a. 17 29 12 16 11
- b. 22 18 23 20 17
- c. 24 37 6 39 29

4.24 Refer to Exercise 4.23. Calculate the variance for each part. Was your answer in Exercise 4.23 correct?

4.25 A friend calculates a variance and reports that it is -25.0. How do you know that he has made a serious calculation error?

4.26 Create a sample of five numbers whose mean is 6 and whose standard deviation is 0.

4.27 A set of data whose histogram is bell shaped yields a mean and standard deviation of 50 and 4, respectively. Approximately what proportion of observations are between 46 and 54?

4.28 Refer to Exercise 4.27. Approximately what proportion of observations are between 42 and 58?

4.29 A set of data whose histogram is extremely skewed yields a mean and standard deviation of 70 and 12, respectively. What is the minimum proportion of observations that are between 46 and 94?

4.30 A statistics practitioner determined that the mean and standard deviation of a data set were 120 and 30, respectively. What can you say about the proportions of observations that lie between each of the following intervals?

- a. 90 and 150
- b. 60 and 180
- c. 30 and 210

The following exercises require a computer and software.

4.31 There has been much media coverage of the high cost of medicinal drugs in the United States. One concern is the large variation from pharmacy to pharmacy. To investigate, a consumer advocacy group took a random sample of 100 pharmacies around the country and recorded the price (in dollars per 100 pills) of Prozac. Compute the range, variance, and standard deviation of the prices. Discuss what these statistics tell you.

4.32 Many traffic experts argue that the most important factor in accidents is not the average speed of cars but the amount of variation. Suppose that the speeds of a sample of 200 cars were taken over a stretch of highway that has seen numerous accidents. Compute the variance and standard deviation of the speeds, and interpret the results.

4.33 Three men were trying to make the football team as punters. The coach had each of them punt the ball 50 times, and the distances were recorded.

- a. Compute the variance and standard deviation for each punter.
- b. What do these statistics tell you about the punters?

4.34 Variance is often used to measure quality in production-line products. Suppose that a sample of steel rods that are supposed to be exactly 100 cm long is taken. The length of each is determined, and the results are recorded. Calculate the variance and the standard deviation. Briefly describe what these statistics tell you.

4.35 To learn more about the size of withdrawals at a banking machine, the proprietor took a sample of 75 withdrawals and recorded the amounts. Determine the mean and standard deviation of these data, and describe what these two statistics tell you about the withdrawal amounts.

4.36 Everyone is familiar with waiting lines or queues. For example, people wait in line at a supermarket to go through the checkout counter. There are two factors that determine how long the queue becomes. One is the speed of service. The other is the number of arrivals at the checkout counter. The