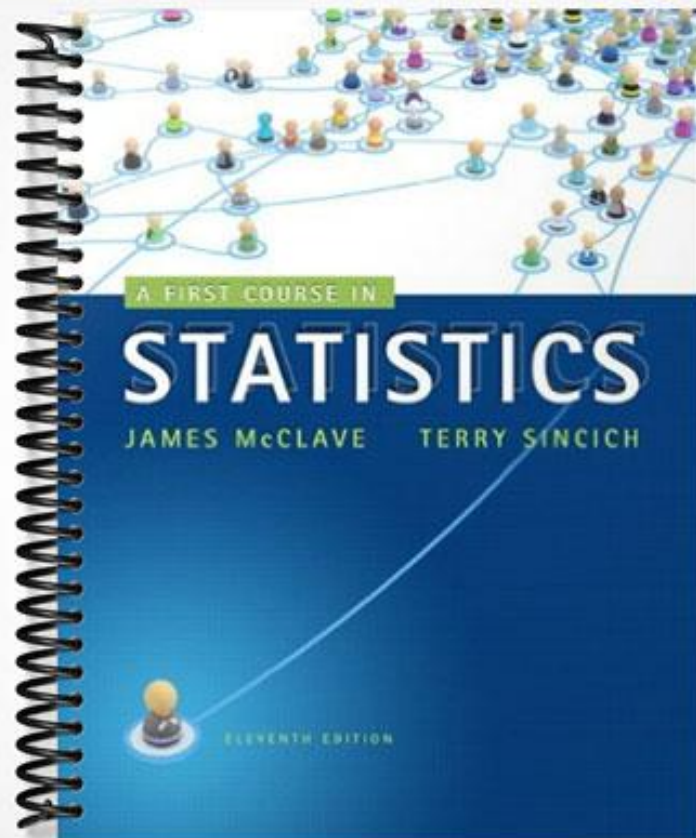


TEST BANK



A FIRST COURSE IN

STATISTICS

JAMES McCLAVE TERRY SINCICH

ELEVENTH EDITION

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Solve the problem.

- 1) In an eye color study, 25 out of 50 people in the sample had brown eyes. 1) _____
 In this situation, what does the number .50 represent?
 A) a class B) a class percentage
 C) a class frequency D) a class relative frequency
- 2) What class percentage corresponds to a class relative frequency of .37? 2) _____
 A) .63% B) .37% C) 37% D) 63%

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

- 3) A sample of 100 e-mail users were asked whether their primary e-mail account was a free account, an institutional (school or work) account, or an account that they pay for personally. 3) _____
 Identify the classes for the resulting data.

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

- 4) What number is missing from the table? 4) _____

Grades on Test	Frequency	Relative Frequency
A	6	.24
B	7	
C	9	.36
D	2	.08
F	1	.04

- A) .70 B) .72 C) .28 D) .07

- 5) What number is missing from the table? 5) _____

Year in College	Frequency	Relative Frequency
Freshman	600	.30
Sophomore	560	.28
Junior		.22
Senior	400	.20

- A) 480 B) 440 C) 520 D) 220

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

- 6) Complete the frequency table for the data shown below.

green blue brown orange blue
 brown orange blue red green
 blue brown green red brown
 blue brown blue blue red

Color	Frequency
Green	
Blue	
Brown	
Orange	

6)

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—
—

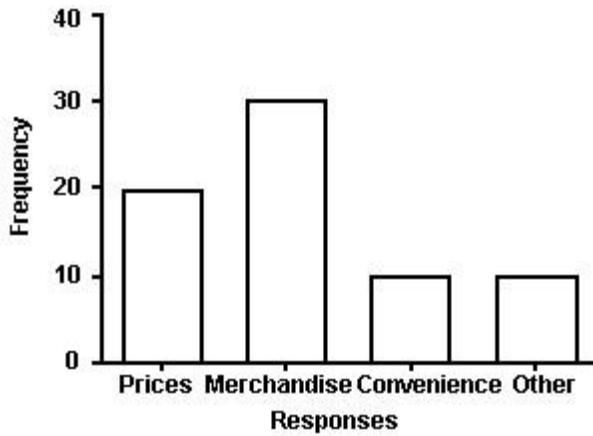
MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Answer the question True or False.

- 7) A frequency table displays the proportion of observations falling into each class. 7) _____
 A) True B) False

Solve the problem.

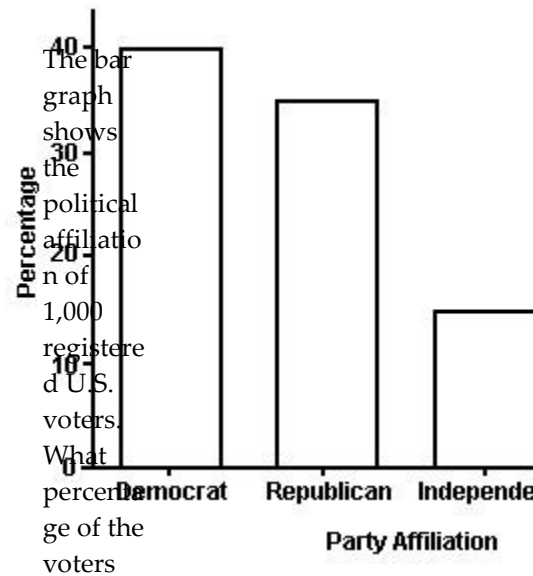
- 8) 8) _____



The manager of a store conducted a customer survey to determine why customers shopped at the store. The results are shown in the figure. What proportion of customers responded that merchandise was the reason they shopped at the store?

- A) 30 B) $\frac{1}{2}$ C) $\frac{3}{7}$ D) $\frac{2}{7}$

9)



belonged 9)
to one of
the
tradition
al two
parties
(Democr
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Republic
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- A) 75% B) 25% C) 35% D) 40%

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

10) The data below show the types of medals won by athletes representing the United States in the 2006 Winter Olympics. 10) _____

gold	gold	silver	gold	bronze	silver
	silver				
bronze	gold	silver	silver	bronze	silver
	gold				
gold	silver	silver	bronze	bronze	gold
	silver				
gold	gold	bronze	bronze		

- Construct a frequency table for the data.
- Construct a relative frequency table for the data.
- Construct a frequency bar graph for the data.

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Answer the question True or False.

11) The bars in a bar graph can be arranged by height in ascending order from left to right. 11) _____

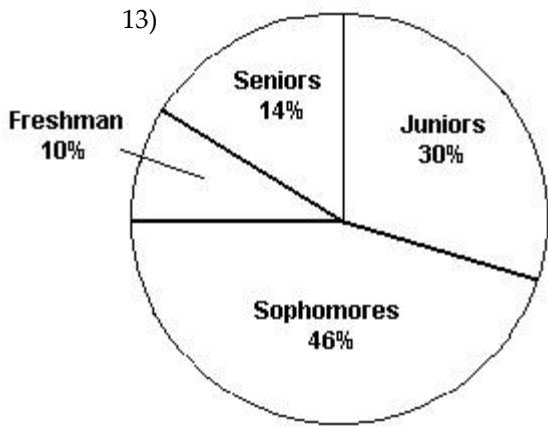
- A) True B) False

12) Either vertical or horizontal bars can be used when constructing a bar graph. 12) _____

- A) True B) False

Solve the problem.

13)



The pie chart shows the classifications of students in a statistics class.

What percentage of the class consists of freshman, sophomores, and juniors?

- A) 86% B) 54% C) 44% D) 14%

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

14) The table shows the number of each type of book found at an online auction site during a recent search. 14) _____

Type of Book	Number
	51,033
	141,114
	253,074
	67,252

- Construct a relative frequency table for the book data.
- Construct a pie chart for the book data.

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or

answers the question.

Answer the question True or False.

- 15) If 25% of your statistics class is sophomores, then in a pie chart representing classifications of the students in your statistics class the slice assigned to sophomores is 90° . 15) _____
A) True B) False
- 16) The slices of a pie chart must be arranged from largest to smallest in a clockwise direction. 16) _____
A) True B) False

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Solve the problem.

- 17) What characteristic of a Pareto diagram distinguishes it from other bar graphs? 17) _____
- 18) The table shows the number of each Ford car sold in the United States in June 2006. 18) _____

Car	Number

- a. Construct a relative frequency table for the car sales.
b. Construct a Pareto diagram for the car sales using the class percentages as the heights of the bars.

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Answer the question True or False.

- 19) Class relative frequencies must be used, rather than class frequencies or class percentages, when constructing a Pareto diagram. 19) _____
A) True B) False
- 20) A Pareto diagram is a pie chart where the slices are arranged from largest to smallest in a counterclockwise direction. 20) _____
A) True B) False

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Solve the problem.

- 21) An annual survey sent to retail store managers contained the question "Did your store suffer any losses due to employee theft?" The responses are summarized in the table for two years, 2000 and 2005. Compare the responses for the two years using side-by-side bar charts. What inferences can be made from the charts?

Employee Theft	Percentage in 2000	Percentage in 2005
Yes	34	23
No	51	68
Don't know	15	9
Totals	100	100

-

22) The data show the total number of medals (gold, silver, and bronze) won by each country winning at least one gold medal in the 2006 Winter Olympics. 22) _____

1 2 3 3 4 9 9 11 11

11 14 14 19 22 23 24 25 29

a. Complete the class frequency table for the data.

Total Medals	Frequency
1-5	
6-10	
11-15	
16-20	
21-25	
26-30	

b. Using the classes from the frequency table, construct a histogram for the data.

23) The total points scored by a basketball team for each game during its last season have been summarized in the table below. 23) _____

Score	Frequency
41-60	3
61-80	8
81-100	12
101-120	7

- Explain why you cannot use the information in the table to construct a stem-and-leaf display for the data.
- Construct a histogram for the scores.

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Answer the question True or False.

24) All class intervals in a histogram have the same width. 24) _____
A) True B) False

25) A histogram can be constructed using either class frequencies or class relative frequencies as the heights of the bars. 25) _____
A) True B) False

- 26) The bars in a histogram should be arranged by height in descending order from left to right. 26) _____
 A) True B) False

Solve the problem.

- 27) A survey was conducted to determine how people feel about the quality of programming available on television. Respondents were asked to rate the overall quality from 0 (no quality at all) to 100 (extremely good quality). The stem-and-leaf display of the data is shown below. 27) _____

Stem	Leaf
3	4 9
4	0 3 4 7 8 9 9 9
5	0 1 1 2 3 4 5
6	1 2 5 6 6
7	1 9
8	
9	6

What percentage of the respondents rated overall television quality as very good (regarded as ratings of 80 and above)?

- A) 1% B) 6% C) 4% D) 24%

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

- 28) The scores for a statistics test are as follows: 28) _____

87 76 91 77 94 94 88 85 66 89
 79 98 51 99 83 88 82 54 18 69

Create a stem-and-leaf display for the data.

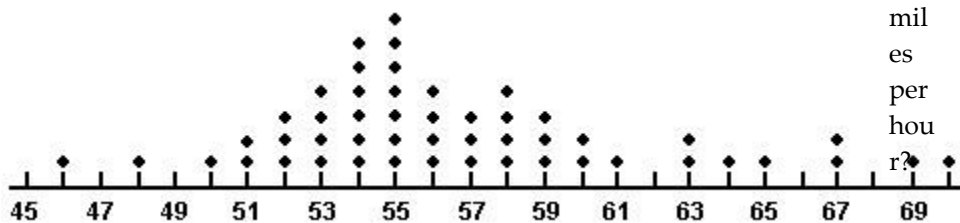
MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Answer the question True or False.

- 29) For large data sets, a stem-and-leaf display is a better choice than a histogram. 29) _____
 A) True B) False

Solve the problem.

- 30) A dot plot of the speeds of a sample of 50 cars passing a policeman with a radar gun is shown below. 30) _____



What proportion of the motorists were driving above the posted speed

- A) 0.02 B) 0.10 C) 1 D) 0.08

31) Which of the graphical techniques below can be used to summarize qualitative data? 31) _____

- A) stem-and-leaf plot B) dot plot
C) bar graph D) box plot

32) Parking at a university has become a problem. University administrators are interested in determining the average time it takes a student to find a parking spot. An administrator inconspicuously followed 180 students and recorded how long it took each of them to find a parking spot. Which of the following types of graphs should not be used to display information concerning the students parking times? 32) _____

- A) box plot B) pie chart
C) histogram D) stem-and-leaf display

33) Fill in the blank. One advantage of the _____ is that the actual data values are retained in the graphical summarization of the data. 33) _____

- A) stem-and-leaf plot
B) pie chart
C) histogram

34) A data set contains the observations 1, 2, 8, 4, 7. Find $\sum x$. 34) _____

- A) 448 B) 15 C) 8 D) 22

35) A data set contains the observations 8, 7, 4, 3, 1. Find $(\sum x)^2$. 35) _____

- A) 139 B) 529 C) 46 D) 23

36) A data set contains the observations 8, 6, 2, 1, 5. Find $\sum x^2$. 36) _____

- A) 484 B) 130 C) 22 D) 44

37) A data set contains the observations 3, 7, 5, 2, 4. Find $\sum(x - 8)$. 37) _____

- A) 13 B) 29 C) -19 D) 61

38) A data set contains the observations 4, 8, 7, 1, 5. Find $\frac{(\sum x)^2}{5}$. 38) _____

- A) 500.0 B) 280.0 C) 30.0 D) 124.0

39) Which expression represents the sum of the squares of the observations in a data set? 39) _____

- A) $\sum x^2$ B) $\sum \sqrt{x}$ C) $(\sum x^2)^2$ D) $\sqrt{\sum x}$

40) A sociologist recently conducted a survey of senior citizens who have net worths too high to qualify for Medicaid but have no private health insurance. The ages of the 25 uninsured senior citizens were as follows:

69 74 46 77 87
 75 62 90 66 91
 70 93 77 63 82
 64 69 82 71 74
 61 88 76 65 83

—
 —

Find the median of the observations.

- A) 74.5 B) 71 C) 74 D) 75

41) The scores for a statistics test are as follows: 41) _____

61 76 93 77 73 92 80 85 78 89
 79 65 50 66 85 91 85 64 18 71

Compute the mean score.

- A) 77.10 B) 75 C) 64.85 D) 73.90

42) A shoe retailer keeps track of all types of information about sales of newly released shoe styles. One newly released style was marketed to tall people. Listed below are the shoe sizes of 12 randomly selected customers who purchased the new style. Find the mode of the shoe sizes. 42) _____

$9\frac{1}{2}$ 11 12 $11\frac{1}{2}$
 $8\frac{1}{2}$ $10\frac{1}{2}$ 8 11
 10 11 $9\frac{1}{2}$ 10

- A) 11 B) $9\frac{1}{2}$ C) $10\frac{1}{2}$ D) $10\frac{1}{4}$

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

43) Each year advertisers spend billions of dollars purchasing commercial time on network television. In the first 6 months of one year, advertisers spent \$1.1 billion. Who were the largest spenders? In a recent article, the top 10 leading spenders and how much each spent (in million of dollars) were listed: 43) _____

Company A	\$70.6	Company F	\$26.9
Company B	63	Company G	25.5
Company C	57.6	Company H	23.8
Company D	56.4	Company I	21.4
Company E	31.1	Company J	19.8

Calculate the mean and median for the data.

44) The data show the total number of medals (gold, silver, and bro nze) won by

each 44) _____
 country _____
 winning _____
 at least _____
 one gold _____
 medal in _____
 the 2006 _____
 Winter _____
 Olympic _____
 s. Find _____
 the _____
 mean, _____
 median, _____
 and _____
 mode of _____
 the _____
 numbers _____
 of _____
 medals _____
 won by _____
 these _____
 countries _____
 .

- 1 2 3 3 4 9 9 11 11
 11 14 14 19 22 23 24 25 29

- 45) Calculate the mean of a sample for which $\sum x = 196$ and $n = 8$. 45) _____
 46) The calculator screens summarize a data set. 46) _____

```
1-Var Stats
x̄=79.95238095
Σx=1679
Σx²=138471
Sx=14.54467666
σx=14.19415101
↓n=21
```

```
1-Var Stats
↑n=21
minX=30
Q1=75
Med=82
Q3=90
maxX=97
█
```

- a. How many data items are in the set?
 b. What is the sum of the data?
 c. Identify the mean, median, and mode, if possible.

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

- 47) At the U.S. Open Tennis Championship a statistician keeps track of every serve that a player hits during the tournament. The statistician reported that the mean serve speed of a particular player was 98 miles per hour. Suppose that the statistician indicated that the serve speed distribution was skewed to the left. Which of the following values is most likely to be the median serve speed?

47)

- _____
- A) 98 mph B) 106 mph C) 90 mph D) 82 mph

48) During one recent year, U.S. consumers redeemed 6.79 billion manufacturers' coupons and saved themselves \$2.52 billion. Calculate and interpret the mean savings per coupon.

48) _____

- A) The average savings was \$0.37 per coupon.
 B) Half of all coupons were worth more than \$0.37 in savings.
 C) The average savings was 269.4 cents per coupon.
 D) Half of all coupons were worth more than 269.4 cents in savings.

49) The output below displays the mean and median for the state high school dropout rates in 1998 and 2002.

49) _____

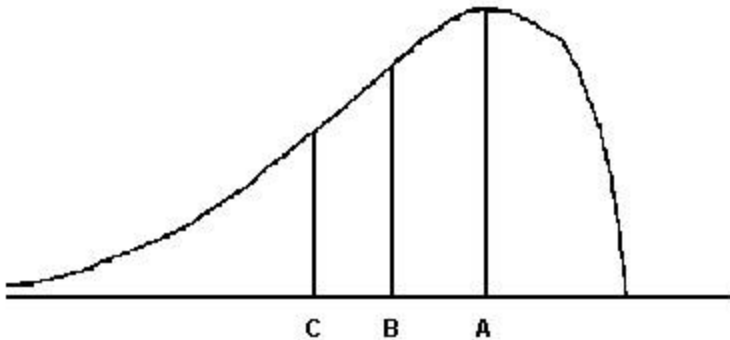
	Drop 1998	Drop 2002
N	51	51
MEAN	28.38	26.81
MEDIAN	27.57	25.69

Interpret the 2002 median dropout rate of 25.69.

- A) The most frequently observed dropout rate of the 51 states was 25.69%.
 B) Half of the 51 states had a dropout rate of 25.69%.
 C) Most of the 51 states had a dropout rate close to 25.69%.
 D) Half of the 51 states had a dropout rate below 25.69%.

50)

50) _____



For the distribution drawn here, identify the mean, median, and mode.

- A) A = mean, B = mode, C = median
 B) A = mode, B = median, C = mean
 C) A = mode, B = mean, C = median
 D) A = median, B = mode, C = mean

51) In a distribution that is skewed to the right, what is the relationship of the mean, median, and mode?

51) _____

- A) mean > median > mode B) mode > median > mode
 C) median > mean > mode D) mode > mean > median

52) Many firms use on-the-job training to teach their employees computer programming. Suppose you work in the personnel department of a firm that just finished training a group of its employees to program, and you

have n
e request
bee ed to

review 52)

the
performa
nce of
one of
the
trainees
on the
final test
that was
given to
all
trainees.
The
mean of
the test
scores is
76.
Addition
al
informati
on
indicated
that the
median
of the
test
scores
was 81.
What
type of
distributi
on most
likely
describes
the
shape of
the test
scores?

—
—

- A) symmetric
- B) unable to determine with the information given
- C) skewed to the right
- D) skewed to the left

53) A shoe company reports the mode for the shoe sizes of men's shoes is 12. Interpret this result.

53) _____

- A) Half of the shoes sold to men are larger than a size 12
- B) Half of all men's shoe sizes are size 12
- C) The most frequently occurring shoe size for men is size 12
- D) Most men have shoe sizes between 11 and 13.

54) Which of the following is *not* a measure of central tendency?

54) _____

- A) median B) range C) mean D) mode

- 55) The distribution of salaries of professional basketball players is skewed to the right. Which measure of central tendency would be the best measure to determine the location of the center of the distribution?
 A) mode B) median C) mean D) range

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

- 56) Parking at a university has become a problem. University administrators are interested in determining the average time it takes a student to find a parking spot. An administrator inconspicuously followed 230 students and recorded how long it took each of them to find a parking spot. The times had a distribution that was skewed to the right. Based on this information, discuss the relationship between the mean and the median for the 230 times collected. 56) _____
- 57) The output below displays the mean and median for the state high school dropout rates in 1998 and 2002. 57) _____

	Drop 1998	Drop 2002
N	51	51
MEAN	28.48	26.55
MEDIAN	27.41	25.76

Use the information to determine the shape of the distributions of the high school dropout rates in 1998 and 2002.

- 58) The total points scored by a basketball team for each game during its last season have been summarized in the table below. Identify the modal class of the distribution of scores. 58) _____

Score	

- 59) The calculator screens summarize a data set. left 59)

```

1-Var Stats
x̄=73.65217391
Σx=1694
Σx²=138696
s̄x=25.16239744
σx=24.60931018
↓n=23
  
```

```

1-Var Stats ?
↑n=23 Ex
minX=0 plai
Q1=73 n.
Med=81
Q3=90
maxX=97
  
```

- Identify the mean and the median.
- Based only on the mean and the median, do you expect that the data set is skewed to the right, symmetric, or skewed to the

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Answer the question True or False.

- 60) The mean and the median are useful measures of central tendency for both qualitative and quantitative data. 60) _____
A) True B) False
- 61) In a symmetric and mound shaped distribution, we expect the values of the mean, median, and mode to differ greatly from one another. 61) _____
A) True B) False
- 62) In symmetric distributions, the mean and the median will be approximately equal. 62) _____
A) True B) False
- 63) In skewed distributions, the mean is the best measure of the center of the distribution since it is least affected by extreme observations. 63) _____
A) True B) False
- 64) In practice, the population mean μ is used to estimate the sample mean \bar{x} . 64) _____
A) True B) False
- 65) In general, the sample mean is a better estimator of the population mean for larger sample sizes. 65) _____
A) True B) False

Solve the problem.

- 66) Each year advertisers spend billions of dollars purchasing commercial time on network television. In the first 6 months of one year, advertisers spent \$1.1 billion. Who were the largest spenders? In a recent article, the top 10 leading spenders and how much each spent (in million of dollars) were listed:

Company A	\$73.7	Company F	\$26.7
Company B	63.9	Company G	26.4
Company C	57.9	Company H	22.8
Company D	57.1	Company I	21.1
Company E	32	Company J	19.8

Calculate the sample variance.

- A) 1987.406 B) 422.940 C) 2217.644 D) 4003.428
- 67) Calculate the range of the following data set: 67) _____
7, 8, 4, 1, 4, 15, 5, 8, 5
A) 1 B) 15 C) 16 D) 14
- 68) The top speeds for a sample of five new automobiles are listed below. Calculate the standard deviation of the speeds. 105, 145,

190, 68)

140, 175

A) 171.9186

B) 143.19

C) 241.0290

D) 33.0530

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

69) The ages of five randomly chosen professors are 63, 42, 69, 66, and 41. Calculate the sample variance of these ages. 69) _____

70) The data show the total number of medals (gold, silver, and bronze) won by each country winning at least one gold medal in the 2006 Winter Olympics. Find the range, sample variance, and sample standard deviation of the numbers of medals won by these countries. 70) _____

1 2 3 3 4 9 9 11 11

11 14 14 19 22 23 24 25 29

71) The calculator screens summarize a data set. 71) _____

```

1-Var Stats
x̄=79.95238095
Σx=1679
Σx²=138471
Sx=14.54467666
σx=14.19415101
↓n=21

```

```

1-Var Stats
↑n=21
minX=30
Q1=75
Med=82
Q3=90
maxX=97

```

- a. Identify the smallest measurement in the data set.
- b. Identify the largest measurement in the data set.
- c. Calculate the range of the data set.

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

72) Calculate the variance of a sample for which $n = 5$, $\sum x^2 = 1320$, $\sum x = 80$. 72) _____

- A) 326.00
- B) 3.16
- C) 10.00
- D) 8.00

73) Calculate the standard deviation of a sample for which $n = 6$, $\sum x^2 = 830$, $\sum x = 60$. 73) _____

- A) 164.00
- B) 6.19
- C) 6.78
- D) 46.00

74) Compute s^2 and s for the data set: -2, 1, -2, -2, 1, -2 74) _____

- A) 2.4; 1.55
- B) 6.6; 2.57
- C) 1.8; 1.34
- D) 2.16; 1.47

75) Compute s^2 and s for the data set: $\frac{7}{10}, \frac{7}{10}, \frac{7}{10}, \frac{7}{10}, \frac{3}{10}, \frac{1}{10}$. 75) _____

- A) 7.067; 2.658
- B) 0.071; 0.266

C) 1.979; 1.407

D) 0.002; 0.045

76) The range of scores on a statistics test was 42. The lowest score was 57. 76) _____
What was the highest score?

A) 70.5

B) 99

C) cannot be determined

D) 78

77) The temperature fluctuated between a low of 73°F and a high of 89°F. 77) _____

Which of the following could be calculated using just this information?

A) variance

B) median

C) standard deviation

D) range

78) Which of the following is a measure of the variability of a distribution? 78) _____

A) range

B) skewness

C) sample size

D) median

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

79) Various state and national automobile associations regularly survey gasoline stations to determine the current retail price of gasoline. Suppose one such national association contacts 200 stations in the United States to determine the price of regular unleaded gasoline at each station. In the context of this problem, define the following descriptive measures: μ , σ , \bar{x} , s . 79) _____

80) Given the sample variance of a distribution, explain how to find the standard deviation. 80) _____

81) Which is expressed in the same units as the original data, the variance or the standard deviation? 81) _____

82) Which measures variability about the mean, the range or the standard deviation? 82) _____

83) For a given data set, which is typically greater, the range or the standard deviation? 83) _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

84) The total points scored by a basketball team for each game during its last season have been summarized in the table below. Which statement following the table must be true? 84) _____

Score

A) The range is 79.

B) The range is at least 81 but at most 100.

C) The range is at least 41 but at most 79.

- 93) A standardized test has a mean score of 500 points with a standard deviation of 100 points. Five students' scores are shown below. 93) _____

Adam: 575 Beth: 690 Carlos: 750 Doug: 280 Ella: 440

Which of the students have scores within two standard deviations of the mean?

- A) Adam, Beth B) Adam, Beth, Ella
C) Adam, Beth, Carlos, Ella D) Carlos, Doug

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

- 94) The mean \bar{x} of a data set is 18, and the sample standard deviation s is 2. Explain what the interval (12, 24) represents. 94) _____

- 95) The calculator screens summarize a data set. 95) _____

```
1-Var Stats
x̄=5.5
Σx=55
Σx²=385
Sx=3.027650354
σx=2.872281323
↓n=10
```

```
1-Var Stats
↑n=10
minX=1
Q1=3
Med=5.5
Q3=8
maxX=10
```

- a. Identify the mean and the sample standard deviation. Round to one place after the decimal, where necessary.
b. Find the interval that corresponds to measurements within two standard deviations of the mean.

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

- 96) At the U.S. Open Tennis Championship a statistician keeps track of every serve that a player hits during the tournament. The statistician reported that the mean serve speed of a particular player was 99 miles per hour (mph) and the standard deviation of the serve speeds was 15 mph. Assume that the statistician also gave us the information that the distribution of the serve speeds was mound-shaped and symmetric. What proportion of the player's serves was between 114 mph and 129 mph? 96) _____
A) 0.95 B) 0.270 C) 129 D) 0.1350

- 97) The amount of television viewed by today's youth is of primary concern to Parents Against Watching Television (PAWT). 300 parents of elementary school-aged children were asked to estimate the number of hours per week that their child watches television. The mean and the standard deviation for their responses were 16 and 2, respectively. PAWT constructed a stem-and-leaf display for the data that showed that the distribution of times was a symmetric, mound-shaped distribution. Give an interval where you believe approximately 95% of the television viewing times fell in the distribution. 97) _____
A) between 10 and 22 hours per week

- B) less than 14 and more than 18 hours per week
- C) between 12 and 20 hours per week
- D) less than 20

98) A sociologist recently conducted a survey of citizens over 60 years of age who have net worths too high to qualify for Medicaid but have no private health insurance. The ages of the 25 uninsured senior citizens were as follows: 98) _____

68 73 66 76 86 74 61 89 65 90 69 92 76
62 81 63 68 81 70 73 60 87 75 64 82

Suppose the mean and standard deviation are 74.04 and 9.75, respectively. If we assume that the distribution of ages is mound-shaped and symmetric, what percentage of the respondents will be between 64.29 and 93.54 years old?

- A) approximately 95%
- B) approximately 68%
- C) approximately 84%
- D) approximately 81.5%

99) A small computing center has found that the number of jobs submitted per day to its computers has a distribution that is approximately mound-shaped and symmetric, with a mean of 85 jobs and a standard deviation of 7. Where do we expect approximately 95% of the distribution to fall? 99) _____

- A) between 64 and 106 jobs per day
- B) between 71 and 99 jobs per day
- C) between 78 and 92 jobs per day
- D) between 99 and 106 jobs per day

100) A study was designed to investigate the effects of two variables □ (1) a student's level of mathematical anxiety and (2) teaching method □ on a student's achievement in a mathematics course. Students who had a low level of mathematical anxiety were taught using the traditional expository method. These students obtained a mean score of 490 with a standard deviation of 50 on a standardized test. Assuming a mound-shaped and symmetric distribution, what percentage of scores exceeded 390? 100) _____

- A) approximately 84%
- B) approximately 95%
- C) approximately 100%
- D) approximately 97.5%

101) A study was designed to investigate the effects of two variables □ (1) a student's level of mathematical anxiety and (2) teaching method □ on a student's achievement in a mathematics course. Students who had a low level of mathematical anxiety were taught using the traditional expository method. These students obtained a mean score of 380 with a standard deviation of 30 on a standardized test. Assuming a mound-shaped and symmetric distribution, in what range would approximately 68% of the students score? 101) _____

- A) between 350 and 410
- B) below 350 and above 410
- C) above 410
- D) below 410

102) A recent survey was conducted to compare the cost of solar energy to the cost of

gas or 102)

electric energy. Results of the survey revealed that the distribution of the amount of the monthly utility bill of a 3-bedroom house using gas or electric energy had a mean of \$140 and a standard deviation of \$11. If the distribution can be considered mound-shaped and symmetric, what percentage of homes will have a monthly utility bill of more than \$129?

-

- A) approximately 34%
- C) approximately 95%

- B) approximately 16%
- D) approximately 84%

- 103) Many firms use on-the-job training to teach their employees computer programming. Suppose you work in the personnel department of a firm that just finished training a group of its employees to program, and you have been requested to review the performance of one of the trainees on the final test that was given to all trainees. The mean and standard deviation of the test scores are 76 and 3, respectively, and the distribution of scores is mound-shaped and symmetric. What percentage of test-takers scored better than a trainee who scored 67? 103) _____
- A) approximately 97.5% B) approximately 100%
 C) approximately 95% D) approximately 84%

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

- 104) At the U.S. Open Tennis Championship a statistician keeps track of every serve that a player hits during the tournament. The statistician reported that the mean serve speed of a particular player was 102 miles per hour (mph) and the standard deviation of the serve speeds was 12 mph. Assume that the statistician also gave us the information that the distribution of serve speeds was mound-shaped and symmetric. Find the percentage of serves that were hit faster than 78 mph. 104) _____

- 105) A small computing center has found that the number of jobs submitted per day to its computers has a distribution that is approximately mound-shaped and symmetric, with a mean of 75 jobs and a standard deviation of 12. On what percentage of days do the number of jobs submitted exceed 87? 105) _____

- 106) By law, a box of cereal labeled as containing 36 ounces must contain at least 36 ounces of cereal. The machine filling the boxes produces a distribution of fill weights that is mound-shaped and symmetric, with a mean equal to the setting on the machine and with a standard deviation equal to 0.03 ounce. To ensure that most of the boxes contain at least 36 ounces, the machine is set so that the mean fill per box is 36.09 ounces. What percentage of the boxes do, in fact, contain at least 36 ounces? 106) _____

- 107) Many firms use on-the-job training to teach their employees computer programming. Suppose you work in the personnel department of a firm that just finished training a group of its employees to program, and you have been requested to review the performance of one of the trainees on the final test that was given to all trainees. The mean and standard deviation of the test scores are 70 and 4, respectively, and the distribution of scores is mound-shaped and symmetric. If a firm wanted to give the best 2.5% of the trainees a big promotion, what test score would be used to identify the trainees in question? 107) _____

- 108) The following data represent the scores of 50 students on a statistics exam. The mean score is 80.02, and the standard deviation is 11.9. 79 79 79 80 80 82 83 83 83
 39 851 869 863 866 888 888 889 890
 71 901 908 914 916 926 936 967 978

108)

What percentage of the scores lies within one standard deviation of the mean? two standard deviations of the mean? three standard deviations of the mean? Based on these percentages, do you believe that the distribution of scores is mound-shaped and symmetric? Explain.

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

- 109) The distribution of scores on a test is mound-shaped and symmetric with a mean score of 78. If 68% of the scores fall between 72 and 84, which of the following is most likely to be the standard deviation of the distribution?
 A) 3 B) 6 C) 2 D) 12

109) _____

- 110) At the U.S. Open Tennis Championship a statistician keeps track of every serve that a player hits during the tournament. The statistician reported that the mean serve speed of a particular player was 102 miles per hour (mph) and the standard deviation of the serve speeds was 15 mph. If nothing is known about the shape of the distribution,

give will
an contain
inter n the
val speed
that s of at

least 110)
three-fourths of
the
player's
serves.

- A) 57 mph to 147 mph B) 132 mph to 162 mph
C) 72 mph to 132 mph D) 87 mph to 117 mph

- 111) By law, a box of cereal labeled as containing 20 ounces must contain at least 20 ounces of cereal. The machine filling the boxes produces a distribution of fill weights with a mean equal to the setting on the machine and with a standard deviation equal to 0.04 ounce. To ensure that most of the boxes contain at least 20 ounces, the machine is set so that the mean fill per box is 20.12 ounces. Assuming nothing is known about the shape of the distribution, what can be said about the proportion of cereal boxes that contain less than 20 ounces. 111) _____
- A) The proportion is at most 11%.
B) The proportion is at most 5.5%.
C) The proportion is less than 2.5%.
D) The proportion is at least 89%.
- 112) A study was designed to investigate the effects of two variables \square (1) a student's level of mathematical anxiety and (2) teaching method \square on a student's achievement in a mathematics course. Students who had a low level of mathematical anxiety were taught using the traditional expository method. These students obtained a mean score of 470 with a standard deviation of 40 on a standardized test. Assuming no information concerning the shape of the distribution is known, what percentage of the students scored between 390 and 550? 112) _____
- A) approximately 68% B) at least 89%
C) approximately 95% D) at least 75%
- 113) A study was designed to investigate the effects of two variables \square (1) a student's level of mathematical anxiety and (2) teaching method \square on a student's achievement in a mathematics course. Students who had a low level of mathematical anxiety were taught using the traditional expository method. These students obtained a mean score of 420 with a standard deviation of 30 on a standardized test. Assuming a non-mound-shaped distribution, what percentage of the students scored over 510? 113) _____
- A) approximately 2.5% B) at least 89%
C) at most 11% D) at most 5.5%
- 114) A recent survey was conducted to compare the cost of solar energy to the cost of gas or electric energy. Results of the survey revealed that the distribution of the amount of the monthly utility bill of a 3-bedroom house using gas or electric energy had a mean of \$99 and a standard deviation of \$14. If nothing is known about the shape of the distribution, what percentage of homes will have a monthly utility bill of less than \$71? 114) _____
- A) at least 75% B) at least 88.9%

C) at most 11.1%

D) at most 25%

- 115) Many firms use on-the-job training to teach their employees computer programming. Suppose you work in the personnel department of a firm that just finished training a group of its employees to program, and you have been requested to review the performance of one of the trainees on the final test that was given to all trainees. The mean and standard deviation of the test scores are 83 and 3, respectively. Assuming nothing is known about the distribution, what percentage of test-takers scored above 92? 115) _____
- A) approximately 0.15% B) at most 11%
C) approximately 99.85% D) at least 89%

- 116) If nothing is known about the shape of a distribution, what percentage of the observations fall within 3 standard deviations of the mean? 116) _____
- A) at least 89% B) approximately 0.3%
C) approximately 99.7% D) at most 11%

- 117) Fill in the blank. _____ gives us a method of interpreting the standard deviation of any data set, regardless of the shape of the distribution. 117) _____
- A) The Empirical Rule B) Chebyshev's Rule
C) both A and B D) neither A nor B

- 118) Fill in the blank. _____ is a method of interpreting the standard deviation of data that have a mound-shaped, symmetric distribution. 118) _____
- A) Chebyshev's Rule B) The Empirical Rule
C) both A and B D) neither A nor B

- 119) Given a data set, which of the following is most likely to be the percentage of data within three standard deviations of the mean? 119) _____
- A) 85% B) 95% C) 70% D) 65%

Answer the question True or False.

- 120) Both Chebyshev's rule and the empirical rule guarantee that no data item will be more than four standard deviations from the mean. 120) _____
- A) True B) False

- 121) Chebyshev's rule applies to qualitative data sets, while the empirical rule applies to quantitative data sets. 121) _____
- A) True B) False

- 122) Chebyshev's rule applies to large data sets, while the empirical rule applies to small data sets. 122) _____
- A) True B) False

- 123) Your teacher announces that the scores on a test have a mean of 83 points with a standard deviation of 4 points, so it is reasonable to expect that you scored at least 70 on the test. 123) _____
- A) True B) False

Solve the problem.

- 124) Many firms use on-the-job training to teach their employees computer programming. Suppose you work in the personnel department of a firm that just finished training a group of its employees to program, and you have been requested to review the performance of one of the trainees on the final test that was given to all trainees. The mean and standard deviation of the test scores are 70 and 4, respectively, and the distribution of scores is mound-shaped and symmetric. Suppose the trainee in question received a score of 57. Compute the trainee's z-score. 124) _____
- A) $z = -52$ B) $z = -3.25$ C) $z = -13$ D) $z = 0.76$
- 125) A recent survey was conducted to compare the cost of solar energy to the cost of gas or electric energy. Results of the survey revealed that the distribution of the amount of the monthly utility bill of a 3-bedroom house using gas or electric energy had a mean of \$115 and a standard deviation of \$12. Three solar homes reported monthly utility bills of \$75, \$74, and \$77. Which of the following statements is true? 125) _____
- A) Homes using solar power may have lower utility bills than homes using only gas and electricity.
 B) The utility bills for homes using solar power are about the same as those for homes using only gas and electricity.
 C) Homes using solar power always have lower utility bills than homes using only gas and electricity.
 D) Homes using solar power may actually have higher utility bills than homes using only gas and electricity.
- 126) A radio station claims that the amount of advertising each hour has a mean of 16 minutes and a standard deviation of 2.7 minutes. You listen to the radio station for 1 hour and observe that the amount of advertising time is 20 minutes. Calculate the z-score for this amount of advertising time. 126) _____
- A) $z = 10.8$ B) $z = -1.48$ C) $z = 1.48$ D) $z = 1.08$
- 127) On a given day, gasoline prices in the state of Colorado had a mean price of \$2.20/gallon with a standard deviation of \$0.09. A particular Colorado gas station had gasoline for \$2.11/gallon. Interpret the z-score for this gas station. 127) _____
- A) The gas price of this Colorado station falls 9 standard deviations above the mean gas price of all Colorado stations.
 B) The gas price of this Colorado station falls 9 standard deviations below the mean gas price of all Colorado stations.
 C) The gas price of this station falls 1 standard deviation below the mean gas price of all Colorado stations.
 D) The gas price of this station falls 1 standard deviation above the mean gas price of all Colorado stations.
- 128) Which of the following is a measure of relative standing? 128) _____
- A) variance B) pie chart C) mean D) z-score

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

- 129) A study was designed to investigate the effects of two variables □ (1) a student's

level of 129)

mathematical anxiety and (2) teaching method on a student's achievement in a mathematics course.

Students who had a low level of mathematical anxiety were taught using the traditional expository method.

These students obtained a mean score of 440 and a standard deviation of 20 on a standardized test.

Find and interpret the z-score of a student who scored 540 on the standardized test.

- 130) A recent survey was conducted to compare the cost of solar energy to the cost of gas or electric energy. Results of the survey revealed that the distribution of the amount of the monthly utility bill of a 3-bedroom house using gas or electric energy had a mean of \$126.00 and a standard deviation of \$8.00. Assuming the distribution is mound-shaped and symmetric, would you expect to see a 3-bedroom house using gas or electric energy with a monthly utility bill of \$186.00? Explain. 130) _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

- 131) Find the z-score for the value 62, when the mean is 74 and the standard deviation is 1. 131) _____
- A) $z = -12.00$ B) $z = 0.82$
 C) $z = -0.82$ D) $z = -13.00$

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

- 132) Test scores for a history class had a mean of 79 with a standard deviation of 4.5. Test scores for a physics class had a mean of 69 with a standard deviation of 3.7. One student earned a 82 on the history test and a 84 on the physics test. Calculate the z-score for each test. On which test did the student perform better? 132) _____

- 133) The following data represent the scores of 50 students on a statistics exam. The mean score is 80.02, and the standard deviation is 11.9. 133) _____

39	51	59	63	66	68	68	69
	70	71					
71	71	73	74	76	76	76	77
	78	79					
79	79	79	80	80	82	83	83
	83	85					
85	86	86	88	88	88	88	89
	89	89					
90	90	91	91	92	95	96	97
	97	98					

Find the z-scores for the highest and lowest exam scores.

- 134) The z-score for a value x is -2.5. State whether the value of x lies above or below the mean and by how many standard deviations. 134) _____
- 135) Suppose that 50 and 75 are two elements of a population data set and their z-scores are -3 and 2, respectively. Find the mean and standard deviation. 135) _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or

answers the question.

Answer the question True or False.

- 136) According to the empirical rule, z-scores of less than -3 or greater than 3 occur very infrequently for data from a mound and symmetric distribution. 136) _____
A) True B) False
- 137) If a z-score is 0 or near 0, the measurement is located at or near the mean. 137) _____
A) True B) False
- 138) If a sample has mean 0 and standard deviation 1, then for every measurement x in the sample the z-score of x is x itself. 138) _____
A) True B) False

Solve the problem.

- 139) When Scholastic Achievement Test scores (SATs) are sent to test-takers, the percentiles associated with scores are also given. Suppose a test-taker scored at the 77th percentile on the verbal part of the test and at the 38th percentile on the quantitative part. Interpret these results. 139) _____
A) This student performed better than 77% of the other test-takers on the verbal part and better than 62% on the quantitative part.
B) This student performed better than 77% of the other test-takers on the verbal part and better than 38% on the quantitative part.
C) This student performed better than 23% of the other test-takers on the verbal part and better than 62% on the quantitative part.
D) This student performed better than 23% of the other test-takers on the verbal part and better than 38% on the quantitative part.

- 140) Summary information is given for the weights (in pounds) of 1000 randomly sampled tractor trailers. 140) _____

MIN:	4008	25%:	5608
MAX:	10,608	75%:	8608
AVE:	7008	Std. Dev.:	1400

Find the percentage of tractor trailers with weights between 5608 and 8608 pounds.

- A) 25% B) 100% C) 75% D) 50%
- 141) The test scores of 30 students are listed below. Which number could be the 30th percentile? 141) _____
- 31 41 45 48 52 55 56 56 63 65
67 67 69 70 70 74 75 78 79 79
80 81 83 85 85 87 90 92 95 99
- A) 56 B) 64 C) 90 D) 67

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

- 142) A retail store's customer satisfaction rating is at the 88th _____ percentile. What

percenta 142) _____
ge of _____
retail _____
stores _____
has _____
higher _____
customer _____
satisfacti _____
on _____
ratings _____
than this _____
store? _____

143) In a summary of recent real estate sales, the median home price is given as \$325,000. What percentile corresponds to a home price of \$325,000? 143) _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Answer the question True or False.

144) The mean of a data set is at the 50th percentile. 144) _____
A) True B) False

145) Percentile rankings are of practical value only with large data sets. 145) _____
A) True B) False

146) The process for finding a percentile is similar to the process for finding the median. 146) _____
A) True B) False

Solve the problem.

147) At the U.S. Open Tennis Championship a statistician keeps track of every serve that a player hits during the tournament. The statistician reported that the mean serve speed of a particular player was 98 miles per hour (mph) and the standard deviation of the serve speeds was 9 mph. Using the z-score approach for detecting outliers, which of the following serve speeds would represent outliers in the distribution of the player's serve speeds? 147) _____

Speeds: 67 mph, 107 mph, and 116 mph

- A) None of the three speeds is an outlier.
- B) 67 and 107 are both outliers, but 116 is not.
- C) 67 is the only outlier.
- D) 67, 107, and 116 are all outliers.

148) The speeds of the fastballs thrown by major league baseball pitchers were measured by radar gun. The mean speed was 88 miles per hour. The standard deviation of the speeds was 6 mph. Which of the following speeds would be classified as an outlier? 148) _____
A) 97 mph B) 76 mph C) 82 mph D) 107 mph

- 149) Which of the following statements concerning the box plot and z-score methods for detecting outliers is false? 149) _____
- A) The z-score method is less affected by an extreme observation in the data set.
 - B) The box plot method is less affected by an extreme observation in the data set.
 - C) The z-score method uses the mean and standard deviation as a basis for detecting outliers.
 - D) The box plot method uses the quartiles as a basis for detecting outliers.

- 150) Which of the following statements could be an explanation for the presence of an outlier in the data? 150) _____
- A) The measurement may be correct and from the same population as the rest but represents a rare event. Generally, we accept this explanation only after carefully ruling out all others.
 - B) The measurement belongs to a population different from that from which the rest of the sample was drawn.
 - C) The measurement is incorrect. It may have been observed, recorded, or entered into the computer incorrectly.
 - D) All of the above are explanations for outliers.

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

- 151) A radio station claims that the amount of advertising each hour has an a mean of 16 minutes and a standard deviation of 2.2 minutes. You listen to the radio station for 1 hour and observe that the amount of advertising time is 10.06 minutes. Based on your observation, what would you infer about the radio station's claim? 151) _____

- 152) The following data represent the scores of 50 students on a statistics exam. The mean score is 80.02, and the standard deviation is 11.9. 152) _____

39	51	59	63	66	68	68	69	70	71
71	71	73	74	76	76	76	77	78	79
79	79	79	80	80	82	83	83	83	85
85	86	86	88	88	88	88	89	89	89
90	90	91	91	92	95	96	97	97	98

Use the z-score method to identify potential outliers among the scores.

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Answer the question True or False.

- 153) The z-score uses the quartiles to identify outliers in a data set. 153) _____
- A) True
 - B) False

- 154) An outlier is defined as any observation that falls within the outer fences of a box plot. 154) _____
 A) True B) False
- 155) Box plots are used to detect outliers in qualitative data sets, while z-scores are used to detect outliers in quantitative data sets. 155) _____
 A) True B) False
- 156) An outlier in a data set may have a simple explanation such as a scale was not working properly or the researcher inverted the digits of a number when recording a measurement. 156) _____
 A) True B) False
- 157) An outlier may be caused by accidentally including the height of a six-year-old boy in a set of data representing the heights of 12-year-old boys. 157) _____
 A) True B) False
- 158) The outer fences of a box plot are three standard deviations from the mean. 158) _____
 A) True B) False

Solve the problem.

- 159) At the U.S. Open Tennis Championship a statistician keeps track of every serve that a player hits during the tournament. The lower quartile of a particular player's serve speeds was reported to be 95 mph. Which of the following interpretations of this information is correct? 159) _____
 A) 75% of the player's serves were hit at speeds greater than 95 mph.
 B) 25% of the player's serves were hit at 95 mph.
 C) 95 serves traveled faster than the lower quartile.
 D) 75% of the player's serves were hit at speeds less than 95 mph.
- 160) A sociologist recently conducted a survey of citizens over 60 years of age who have net worths too high to qualify for Medicaid but have no private health insurance. The ages of the 25 uninsured senior citizens were as follows: 160) _____
- 68 73 66 76 86 74 61 89 65 90 69 92 76
 62 81 63 68 81 70 73 60 87 75 64 82
- Find the upper quartile of the data.
 A) 73 B) 81.5 C) 65.5 D) 92

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

- 161) The amount of television viewed by today's youth is of primary concern to Parents Against Watching Television (PAWT). Three hundred parents of elementary school-aged children were asked to estimate the number of hours per week that their child watches television. The upper quartile for the distribution was given as 14 hours. Interpret this value. 161) _____

- 162) For a given data set, the lower quartile is 45, the median is 50, and the upper quartile is 57. The minimum value in the data set is 32, and the maximum is 81. 162) _____
- Find the interquartile range.
 - Find the inner fences.
 - Find the outer fences.
 - Is either of the minimum or maximum values considered an outlier? Explain.

- 163) The calculator screens summarize a data set. 163) _____

```

1-Var Stats
x̄=79.95238095
Σx=1679
Σx²=138471
Sx=14.54467666
σx=14.19415101
↓n=21
  
```

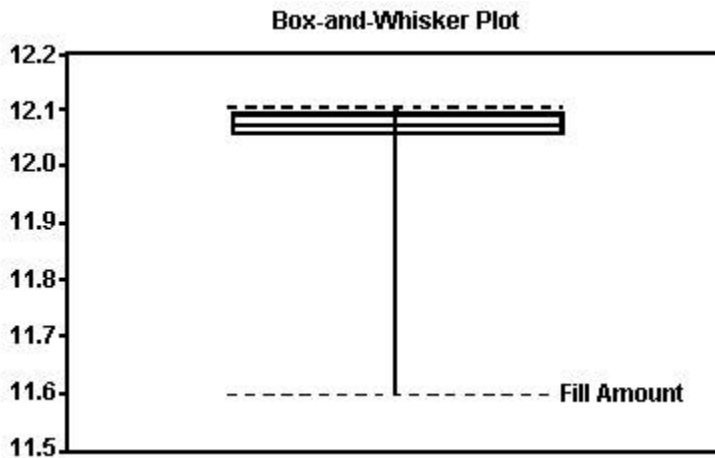
```

1-Var Stats
n=21
minX=30
Q1=75
Med=82
Q3=90
maxX=97
  
```

- Identify the lower and upper quartiles of the data set.
- Find the interquartile range.
- Is there reason to suspect that the data may contain an outlier? Explain.

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

- 164) The box plot shown below displays the amount of soda that was poured by a filling machine into 12-ounce soda cans at a local bottling company. 164) _____



Based on the box plot, what shape do you believe the distribution of the data to have?

- skewed to the left
- skewed to the right
- approximately symmetric
- skewed to the center

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

- 165) The following data represent the scores of 50 students on a statistics exam.
- | | | | | | | | | | |
|--|----|----------------|----------------|-----|----------------|-----|----------------|----------------|-----|
| | 39 | 851 | 869 | 863 | 886 | 888 | 888 | 889 | 890 |
| | 71 | 901 | 908 | 914 | 916 | 926 | 926 | 967 | 978 |
| | 79 | 79 | 79 | 80 | 80 | 82 | 83 | 83 | 83 |

a. Find the lower quartile, the upper quartile, and the median of the scores.

b. Find the interquartile range of the data and use it to identify potential outliers.

c. In a box plot for the data, which scores, if any, would be outside the outer fences? Which scores, if any, would be outside the inner fences but inside the outer fences?

166) Use a graphing calculator or software to construct a box plot for the following data set. 166) _____

12 18 14 17 19 16 14 18 15 17 11
13 14 11 16 18 15 13 17 15 14 19
12 16 17

167) The data below represent the numbers of absences and the final grades of 15 randomly selected students from a statistics class. Construct a scattergram for the data. Do you detect a trend?

Student	Number of Absences	Final Grade as a Percent	
1	5	79	_____
2	6	78	_____
3	2	86	_____
4	12	56	
5	9	75	
6	5	90	
7	8	78	
8	15	48	
9	0	92	
10	1	78	
11	9	81	
12	3	86	
13	10	75	
14	3	89	
15	11	65	

168) The scores of nine members of a women's golf team in two rounds of tournament play are listed below. 168) _____

Player	1	2	3	4	5	6	7	8	9
Round 1	85	90	87	78	92	85	79	93	86
Round 2	90	87	85	84	86	78	77	91	82

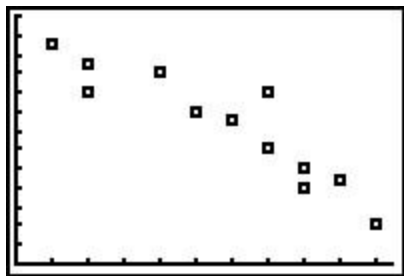
Construct a scattergram for the data.

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Answer the question True or False.

169) Scatterplots are useful for both qualitative and quantitative data. 169) _____
 A) True B) False

170) The scatterplot below shows a negative relationship between two variables. 170) _____



A) True B) False

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Solve the problem.

171) Explain how stretching the vertical axis of a histogram can be misleading. 171) _____

172) Explain how using a scale break on the vertical axis of a histogram can be misleading. 172) _____

173) Explain how it can be misleading to draw the bars in a histogram so that the width of each bar is proportional to its height rather than have all bars the same width.

173) _____

174) Explain how it can be misleading to report only the mean of a distribution without any measure of the variability.

174) _____

- 1) D
- 2) C
- 3) free account, institutional account, account paid for personally
- 4) C
- 5) B
- 6)

Color	Frequency
Green	3
Blue	7
Brown	5
Orange	2
Red	3

- 7) B
- 8) C
- 9) A

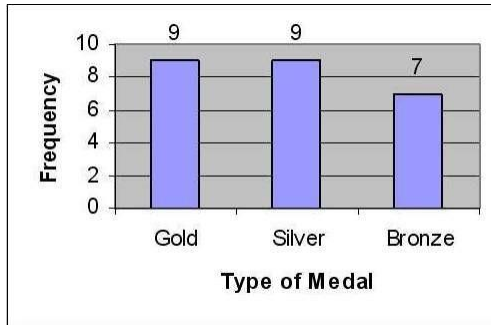
10) a.

Medal	Frequency
	9
	9
	7

b.

Medal	Relative Frequency
	.36
	.36
	.28

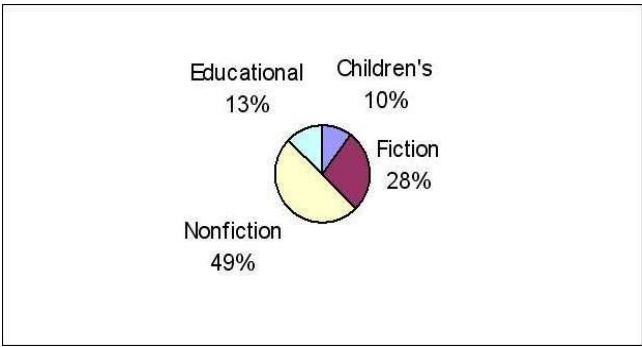
c.



- 11) A
- 12) A
- 13) A
- 14) a.

Type of Book	Relative Frequency
	.10
	.28
	.49
	.13

b.



15) A

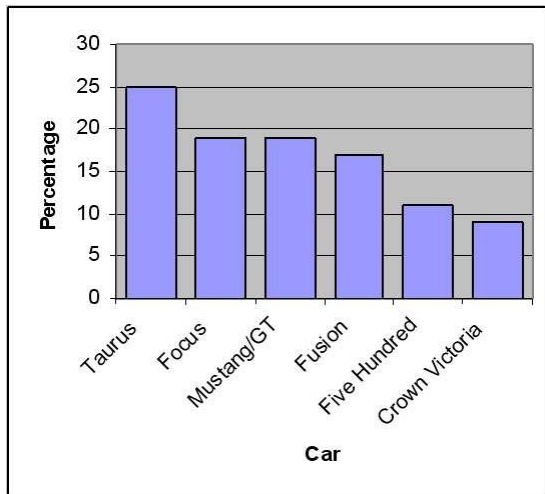
16) B

17) In a Pareto diagram, the bars are arranged by height in a descending order from left to right.

18) a.

Car	Relative Frequency
	.09
	.11
	.25
	.17
	.19
	.19

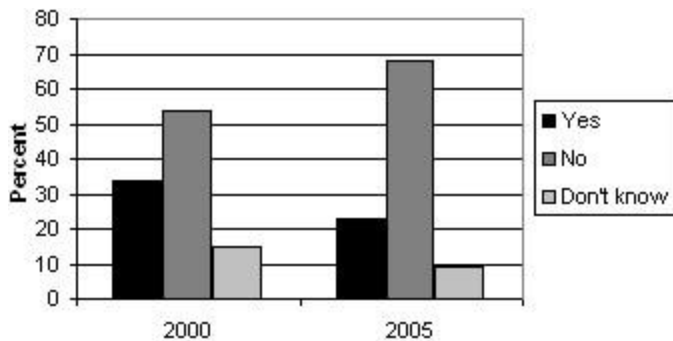
b.



19) B

20) B

21)

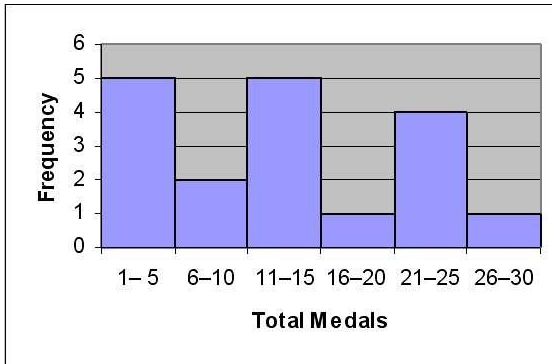


Losses due to employee theft have decreased from 2000 to 2005.

22) a.

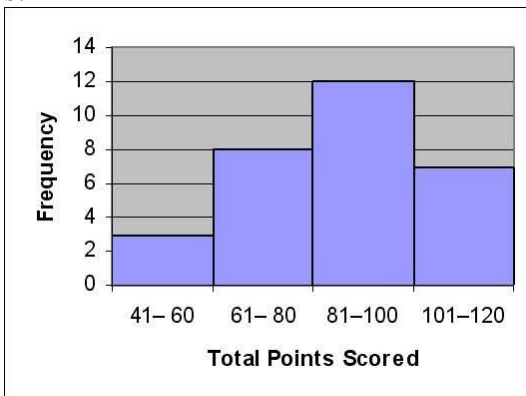
Total Medals	Frequency
1-5	5
6-10	2
11-15	5
16-20	1
21-25	4
26-30	1

b.



23) a. The exact scores would be needed to construct a stem-and-leaf display but the exact scores are not available in the table given.

b.



24) A

25) A

26) B

27) C

28)

Stem	Leaf
1	8
2	
3	
4	
5	1 4
6	6 9
7	6 7 9
8	2 3 5 7 8 8 9
9	1 4 4 8 9

29) B

30) D

- 31) C
- 32) B
- 33) A
- 34) D
- 35) B
- 36) B
- 37) C
- 38) C
- 39) A
- 40) C
- 41) D
- 42) A
- 43)

$$\frac{\sum x}{n}$$

The mean of the data is $x = \frac{70.6 + 63 + 57.6 + 56.4 + 31.1 + 26.9 + 25.5 + 23.8 + 21.4 + 19.8}{10}$

$$= \frac{396.1}{10} = 39.61 \Rightarrow \$39.61 \text{ million}$$

The median is the average of the middle two observations.

$$M = \frac{31.1 + 26.9}{2} = 29.00 \Rightarrow \$29.00 \text{ million}$$

- 44) The mean is the sum of the numbers divided by 18:

$$\frac{1 + 2 + 3 + 3 + 4 + 9 + 9 + 11 + 11 + 11 + 14 + 14 + 19 + 22 + 23 + 24 + 25 + 29}{18}$$

$$= \frac{234}{18} = 13 \text{ medals.}$$

The median is the mean of the two middle numbers: $\frac{11 + 11}{2} = 11$ medals.

The mode is the most frequent number of medals: 11 medals.

- 45) The mean is divided by n:

$$\frac{\sum x}{n} = \frac{196}{8} = 24.5.$$

- 46) a. $n = 21$
- b. $\sum x = 1679$
- c. mean: $\bar{x} \approx 79.95$; median: Med=82; mode: not possible

- 47) B
- 48) A
- 49) D
- 50) B
- 51) A
- 52) D
- 53) C
- 54) B
- 55) B

- 56) Since the distribution is skewed to the right, we know that the mean time will exceed the median time.
- 57) In both 1998 and 2002, the mean dropout rates exceed the median dropout rates. This indicates that both the 1998 and 2002 high school dropout rates have distributions that are skewed to the right.

58) The modal class is the class with the greatest frequency: 81-100 points.

- 59) a. mean: $\bar{x} \approx 73.65$; median: Med=81
 b. We expect the data to be skewed to the left because the mean is less than the median.

60) B

61) B

62) A

63) B

64) B

65) A

66) B

67) D

68) D

69)
$$s^2 = \frac{\sum(x - \bar{x})^2}{n - 1}$$

$$\bar{x} = \frac{\sum x}{n} = \frac{63 + 42 + 69 + 66 + 41}{5} = 56.2$$

$$s^2 = \frac{(63 - 56.2)^2 + (42 - 56.2)^2 + (69 - 56.2)^2 + (66 - 56.2)^2 + (41 - 56.2)^2}{5 - 1} = 184.70$$

70) The range is $29 - 1 = 28$ medals.

$$\text{The variance is } s^2 = \frac{\sum x^2 - \frac{(\sum x)^2}{n}}{n - 1} = \frac{4372 - \frac{(234)^2}{18}}{17} = \frac{1330}{17} \approx 78.24$$

$$\text{The standard deviation is } s = \sqrt{s^2} = \sqrt{\frac{1330}{17}} \approx 8.85$$

- 71) a. minX=30
 b. maxX=97
 c. $97 - 30 = 67$

72) C

73) C

74) A

75) B

76) B

77) D

78) A

79) μ is the mean price of the regular unleaded gasoline prices of all retail gas stations in the United States.

σ is the standard deviation of the regular unleaded gasoline prices of all retail gas stations in the United States.

\bar{x} is price of the regular unleaded gasoline prices collected from the 200 stations sampled.

the
mean
n s is the standard deviation of the regular unleaded gasoline prices collected from the 200 stations sampled.

- 80) Take the square root of the sample variance to find the sample standard deviation.
- 81) standard deviation
- 82) standard deviation
- 83) range
- 84) C
- 85) A
- 86) A
- 87) A
- 88) B
- 89) B
- 90) A
- 91) A
- 92) B
- 93) B
- 94) measurements within three standard deviations of the mean
- 95) a. mean: $\bar{x} = 5.5$; sample standard deviation: $S_x \approx 3.0$
b. $(5.5 - 2 \times 3.0, 5.5 + 2 \times 3.0) = (-.5, 11.5)$
- 96) D
- 97) C
- 98) D
- 99) B
- 100) D
- 101) A
- 102) D
- 103) B
- 104) We use the Empirical Rule to determine the percentage of serves with speeds faster than 78 mph. We do this by first finding the percentage of serves with speeds between 78 and 102 mph. The Empirical Rule states that approximately 34.0% (68%/2) fall between 78 and 102 mph. Because the distribution is symmetric about the mean speed of 102 mph, we know 50% of the serve speeds were faster than 102 mph. We add these findings together to determine that $34.0\% + 50\% = 84.0\%$ of the serves were hit faster than 78 mph.
- 105) The value 87 falls one standard deviation above the mean in the distribution. Using the Empirical Rule, 68% of the days will have between 63 and 87 jobs submitted. Of the remaining 32% of the days, half, or $32\%/2 = 16\%$, of the days will have more than 87 jobs submitted.
- 106) The value of 36 ounces falls three standard deviations below the mean. The Empirical Rule states that approximately all of the boxes will contain cereal amounts between 36.00 ounces and 36.18 ounces. Therefore, approximately 100% of the boxes contain at least 36 ounces.
- 107) The Empirical Rule states that 95% of the data will fall between 62 and 78. Because the distribution is symmetric, half of the remaining 5%, or 2.5%, will have test scores above 78. Thus, 78 is the cutoff point that will identify the trainees who will receive the promotion.
- 108) 74% of the scores lie within one standard deviation of the mean, 96% within two standard deviations, and 98% within three standard deviations. These percentages are close to those given in the Empirical Rule, so the distribution is roughly mound-shaped and symmetric, though obviously skewed slightly to the left.

- 109) B
- 110) C
- 111) A
- 112) D
- 113) C
- 114) D
- 115) B
- 116) A
- 117) B
- 118) B
- 119) B
- 120) B
- 121) B
- 122) B
- 123) A
- 124) B
- 125) A
- 126) C
- 127) C
- 128) D

129)

$$\text{The z-score is } z = \frac{x - \mu}{\sigma} .$$

$$\text{For a score of } 54, z = \frac{540 - 440}{20} = 5.00.$$

This student's score falls 5.00 standard deviations above the mean score of 440.

- 130) The z-score for the value \$186.00 is:

$$z = \frac{x - \bar{x}}{s} = \frac{186 - 126}{8} = 7.5$$

An observation that falls 7.5 standard deviations above the mean is very unlikely. We would not expect to see a monthly utility bill of \$186.00 for this home.

- 131) A
- 132) history z-score = 0.67; physics z-score = 4.05; The student performed better on the physics test.
- 133) highest: z = 1.51; lowest: z = -3.45
- 134) The value of x lies 2.5 standard deviations below the mean.
- 135) mean: 65; standard deviation: 5
- 136) A
- 137) A
- 138) A
- 139) B
- 140) D
- 141) B
- 142) 12%
- 143) 50th percentile
- 144) B
- 145) A
- 146) A
- 147) C
- 148) D

149) A

150) D

151) The z-score for the value 10.06 is -2.7

Since the z-score would not indicate that 10.06 minutes represents an outlier, there is no evidence that the station's claim is incorrect.

152) The z-score of 39 is -3.46. Since this z-score is less than -3, the score of 39 is an outlier. All other scores have z-scores between -3 and 3, so there are no other outliers.

153) B

154) B

155) B

156) A

157) A

158) B

159) A

160) B

161) 75% of the TV viewing times are less than 14 hours per week. 25% of the times exceed 14 hours per week.

162) a. The interquartile range is $57 - 45 = 12$.

b. The inner fences are $45 - 1.5(12) = 27$ and $57 + 1.5(12) = 75$.

c. The outer fences are $45 - 3(12) = 9$ and $57 + 3(12) = 93$.

d. The maximum of 81 is a potential outlier since it lies outside the inner fences. The minimum is within the inner fence and is not considered to be an outlier.

163) a. lower quartile: $Q1=75$; upper quartile: $Q3=90$

b. interquartile range: $90 - 75 = 15$

c. Yes; the smallest measurement, 30, is three times the interquartile range less than the lower quartile, so it is a suspected outlier.

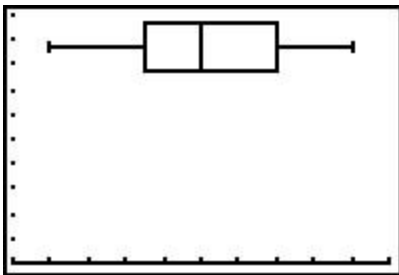
164) A

165) a. The lower quartile is 73, the upper quartile is 89, and the median is 81.

b. The interquartile range is $89 - 73 = 16$. The score of 39 is a potential outlier since it is less than $73 - 1.5(16) = 49$.

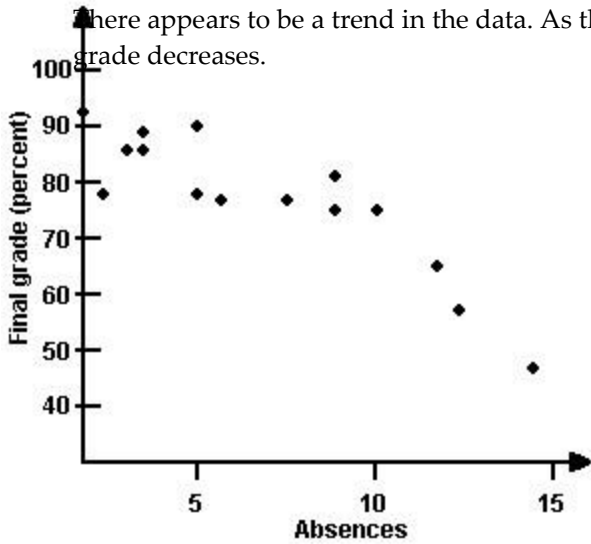
c. No scores fall outside the outer fences, 25 and 137. Only the score of 39 lies between the inner and outer fences.

166) The horizontal axis extends from 10 to 20, with each tick mark representing one unit.

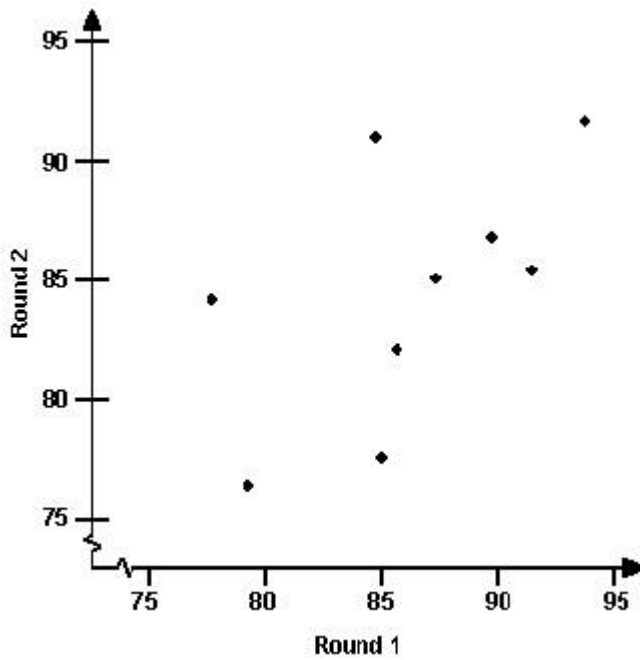


167)

There appears to be a trend in the data. As the number of absences increases, the final grade decreases.



168)



169) B

170) A

171) Stretching the vertical axis may overemphasize the differences in the heights of the bars making the taller bars look much taller than the shorter bars.

172) Using a scale break on the vertical axis may make the shorter bars look disproportionately shorter than the taller bars.

173) The reader may think that the area of the bar represents the quantity rather than the height of the bar, giving a disproportionate emphasis on the taller bars.

174) When comparing means from two different distributions, the difference between them may be insignificant if the variability in one or both of the distributions is large.