

**CHAPTER 3—DESCRIPTIVE STATISTICS: NUMERICAL MEASURES**

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**MULTIPLE CHOICE**

1. The interquartile range is the difference between the
- first and second quartiles
  - first and third quartiles
  - second and third quartiles
  - second and fourth quartiles

ANS: B                   PTS: 1

2. The coefficient of determination is equal to the
- absolute value of the correlation coefficient
  - squared value of the correlation coefficient
  - square-root of the correlation coefficient
  - inverse value of the correlation coefficient

ANS: B                   PTS: 1

3. Generally, which one of the following is the least appropriate measure of central tendency for a data set that contains outliers?
- mean
  - median
  - 2<sup>nd</sup> quartile
  - 50<sup>th</sup> percentile

ANS: A                   PTS: 1

4. An important measure of location for categorical data is the
- mean
  - median
  - mode
  - margin

ANS: C                   PTS: 1

5. The measure of variability easiest to compute, but seldom used as the only measure, is the
- range
  - interquartile range
  - standard deviation
  - variance

ANS: A                   PTS: 1

6. In computing descriptive statistics for grouped data, the \_\_\_\_ are used to approximate the data values in each class.
- class lower limits
  - class upper limits
  - class midpoints
  - class ranges

ANS: C                   PTS: 1

7. Which of the following is not a measure of variability of a single variable?
- range
  - covariance
  - standard deviation
  - coefficient of variation

ANS: B                      PTS: 1

8. The empirical rule states that, for data having a bell-shaped distribution, the percentage of data values being within one standard deviation of the mean is approximately
- 33
  - 50
  - 68
  - 95

ANS: C                      PTS: 1

9. A box plot is a graphical representation of data that is based on
- the empirical rule
  - z-scores
  - a histogram
  - a five-number summary

ANS: D                      PTS: 1

10. The coefficient of variation indicates how large the standard deviation is relative to the
- mean
  - median
  - range
  - variance

ANS: A                      PTS: 1

11. Which of the following descriptive statistics is not measured in the same units as the data?
- 35<sup>th</sup> percentile
  - standard deviation
  - variance
  - interquartile range

ANS: C                      PTS: 1

12. A numerical measure computed from a sample, such as sample mean, is known as a
- population parameter
  - sample parameter
  - sample statistic
  - population mean

ANS: C                      PTS: 1

13. A numerical measure, such as a mean, computed from a population is known as a
- population parameter
  - sample parameter
  - sample statistic
  - sample mean

ANS: A                      PTS: 1

14. Since the population size is always larger than the sample size, then the sample statistic
- can never be larger than the population parameter
  - can never be equal to the population parameter
  - can never be zero
  - None of the other answers are correct.

ANS: D                    PTS: 1

15.  $\mu$  is an example of a
- population parameter
  - sample statistic
  - population variance
  - mode

ANS: A                    PTS: 1

16. The mean of a sample is
- always equal to the mean of the population
  - always smaller than the mean of the population
  - computed by summing the data values and dividing the sum by  $(n - 1)$
  - computed by summing all the data values and dividing the sum by the number of items

ANS: D                    PTS: 1

17. The mean of the sample
- is always larger than the mean of the population from which the sample was taken
  - is always smaller than the mean of the population from which the sample was taken
  - can never be zero
  - None of the other answers are correct.

ANS: D                    PTS: 1

18. Since the population is always larger than the sample, the value of the sample mean
- is always smaller than the true value of the population mean
  - is always larger than the true value of the population mean
  - is always equal to the true value of the population mean
  - could be larger, equal to, or smaller than the true value of the population mean

ANS: D                    PTS: 1

19. After the data has been arranged from smallest value to largest value, the value in the middle is called the
- range
  - median
  - mean
  - None of the other answers are correct.

ANS: B                    PTS: 1

20. If a data set has an even number of observations, the median
- can not be determined
  - is the average value of the two middle items
  - must be equal to the mean
  - is the average value of the two middle items when all items are arranged in ascending order

ANS: D                    PTS: 1

21. Since the median is the middle value of a data set, it must always be
- smaller than the mode
  - larger than the mode
  - smaller than the mean
  - None of the other answers are correct.

ANS: D                    PTS: 1

22. The most frequently occurring value of a data set is called the
- range
  - mode
  - mean
  - None of the other answers are correct.

ANS: B                    PTS: 1

23. Since the mode is the most frequently occurring data value, it
- can never be larger than the mean
  - is always larger than the median
  - is always larger than the mean
  - None of the other answers are correct.

ANS: D                    PTS: 1

24. Excel's \_\_\_\_\_ function can be used to compute the mean.
- MAX
  - AVERAGE
  - MEDIAN
  - MODE

ANS: B                    PTS: 1

25. Excel's \_\_\_\_\_ function can be used to compute the median.
- MAX
  - AVERAGE
  - MEDIAN
  - MODE

ANS: C                    PTS: 1

26. Excel's \_\_\_\_\_ function can be used to compute the mode.
- MAX
  - AVERAGE
  - MEDIAN
  - MODE.SNGL

ANS: D                    PTS: 1

27. Excel provides functions for computing the
- mean
  - median
  - mode
  - Excel provides functions for all of these.

ANS: D                   PTS: 1

28. In computing the  $p^{\text{th}}$  percentile, if the index  $i$  is an integer the  $p^{\text{th}}$  percentile is the
- data value in position  $i$
  - data value in position  $i + 1$
  - average of data values in position  $i$  and  $i + 1$

ANS: C                   PTS: 1

29. The 50th percentile is the
- mode
  - median
  - mean
  - third quartile

ANS: B                   PTS: 1

30. The 75th percentile is also the
- first quartile
  - second quartile
  - third quartile
  - fourth quartile

ANS: C                   PTS: 1

31. The first quartile
- contains at least one third of the data elements
  - is the same as the 25th percentile
  - is the same as the 50th percentile
  - is the same as the 75th percentile

ANS: B                   PTS: 1

32. Which of the following is not a measure of location?
- mean
  - median
  - variance
  - mode

ANS: C                   PTS: 1

33. The median of a sample will always equal the
- mode
  - mean
  - 50th percentile
  - all of these answers are correct

ANS: C                   PTS: 1

34. The measure of location that is the most likely to be influenced by extreme values in the data set is the
- range
  - median
  - mode
  - mean

ANS: D                   PTS: 1

**Exhibit 3-1**

A researcher has collected the following sample data.

5	12	6	8	5
6	7	5	12	4

35. Refer to Exhibit 3-1. The median is
- 5
  - 6
  - 7
  - 8

ANS: B                   PTS: 1

36. Refer to Exhibit 3-1. The mode is
- 5
  - 6
  - 7
  - 8

ANS: A                   PTS: 1

37. Refer to Exhibit 3-1. The mean is
- 5
  - 6
  - 7
  - 8

ANS: C                   PTS: 1

38. Refer to Exhibit 3-1. The 75th percentile is
- 5
  - 6
  - 7
  - 8

ANS: D                   PTS: 1

**Exhibit 3-2**

A researcher has collected the following sample data. The mean of the sample is 5.

3	5	12	3	2
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39. Refer to Exhibit 3-2. The variance is
- 80
  - 4.062
  - 13.2
  - 16.5

ANS: D                   PTS: 1

40. Refer to Exhibit 3-2. The standard deviation is
- 8.944
  - 4.062

- c. 13.2
- d. 16.5

ANS: B                      PTS: 1

41. Refer to Exhibit 3-2. The coefficient of variation is
- a. 72.66%
  - b. 81.24%
  - c. 264%
  - d. 330%

ANS: B                      PTS: 1

42. Refer to Exhibit 3-2. The range is
- a. 1
  - b. 2
  - c. 10
  - d. 12

ANS: C                      PTS: 1

43. Refer to Exhibit 3-2. The interquartile range is
- a. 1
  - b. 2
  - c. 10
  - d. 12

ANS: B                      PTS: 1

**Exhibit 3-3**

Suppose annual salaries for sales associates from a particular store have a bell-shaped distribution with a mean of \$32,500 and a standard deviation of \$2,500.

44. Refer to Exhibit 3-3. The  $z$ -score for a sales associate from this store who earns \$37,500 is
- a. 37.5
  - b. 2
  - c. -2
  - d. 0.92

ANS: B                      PTS: 1

45. Refer to Exhibit 3-3. The  $z$ -score for a sales associate from this store who earns \$28,000 is
- a. 28
  - b. 1.8
  - c. -1.8
  - d. 0.78

ANS: C                      PTS: 1

**Exhibit 3-4**

The following is the frequency distribution for the speeds of a sample of automobiles traveling on an interstate highway.

Speed (MPH)	Frequency
50 – 54	2
55 – 59	4

60 – 64	5
65 – 69	10
70 – 74	9
75 – 79	<u>5</u>
	35

46. Refer to Exhibit 3-4. The mean is
- 35
  - 670
  - 10
  - 67

ANS: D                   PTS: 1

47. Refer to Exhibit 3-4. The variance is
- 6.969
  - 7.071
  - 48.570
  - 50.000

ANS: D                   PTS: 1

48. Refer to Exhibit 3-4. The standard deviation is
- 6.969
  - 7.071
  - 48.570
  - 50.000

ANS: B                   PTS: 1

49. The difference between the largest and the smallest data values is the
- variance
  - interquartile range
  - range
  - coefficient of variation

ANS: C                   PTS: 1

50. The interquartile range is
- the 50th percentile
  - another name for the variance
  - the difference between the largest and smallest values
  - the difference between the third quartile and the first quartile

ANS: D                   PTS: 1

51. The interquartile range is used as a measure of variability to overcome what difficulty of the range?
- the sum of the range variances is zero
  - the range is difficult to compute
  - the range is influenced too much by extreme values
  - the range is negative

ANS: C                   PTS: 1

52. The sample variance



- a. is always smaller than the true value of the population variance
- b. is always larger than the true value of the population variance
- c. could be smaller, equal to, or larger than the true value of the population variance
- d. can never be zero

ANS: C                      PTS: 1

53. The variance of the sample
- a. can never be negative
  - b. can be negative
  - c. cannot be zero
  - d. cannot be less than one

ANS: A                      PTS: 1

54. The population variance can never be
- a. zero
  - b. larger than the standard deviation
  - c. negative
  - d. all of these are correct

ANS: C                      PTS: 1

55. The sum of deviations of the individual data elements from their mean is
- a. always greater than zero
  - b. always less than zero
  - c. sometimes greater than and sometimes less than zero, depending on the data elements
  - d. always equal to zero

ANS: D                      PTS: 1

56. The value of the sum of the squared deviations from the mean, i.e.,  $\sum(x - \bar{x})^2$  must always be
- a. less than the mean
  - b. negative
  - c. either positive or negative depending on whether the mean is negative or positive
  - d. at least zero

ANS: D                      PTS: 1

57. If the variance of a data set is correctly computed with the formula using  $n - 1$  in the denominator, which of the following is true?
- a. the data set is a sample
  - b. the data set is a population
  - c. the data set could be either a sample or a population
  - d. the data set is from a census

ANS: A                      PTS: 1

58. During a cold winter, the temperature stayed below zero for ten days (ranging from -20 to -5). The variance of the temperatures of the ten day period
- a. is negative since all the numbers are negative
  - b. must be at least zero
  - c. can not be computed since all the numbers are negative
  - d. can be either negative or positive

ANS: B                      PTS: 1

59. The variance of a sample of 81 observations equals 64. The standard deviation of the sample equals
- 0
  - 4096
  - 8
  - 6,561

ANS: C                    PTS: 1

60. The standard deviation of a sample of 100 observations equals 64. The variance of the sample equals
- 8
  - 10
  - 6,400
  - 4,096

ANS: D                    PTS: 1

61. The numerical value of the standard deviation can never be
- larger than the variance
  - zero
  - negative
  - all of these statements are correct

ANS: C                    PTS: 1

62. Excel's \_\_\_\_\_ function can be used to compute the sample variance.
- MAX
  - MODE
  - VAR.S
  - STDEV

ANS: C                    PTS: 1

63. Excel's \_\_\_\_\_ function can be used to compute the population variance.
- MAX
  - MODE
  - VAR
  - None of the other answers are correct.

ANS: D                    PTS: 1

64. Excel's \_\_\_\_\_ function can be used to compute the sample standard deviation.
- MAX
  - MODE
  - VAR
  - STDEV.S

ANS: D                    PTS: 1

65. Excel's \_\_\_\_\_ function can be used to compute the population standard deviation.
- MAX
  - MODE
  - STDEV
  - None of the other answers are correct.

ANS: D                    PTS: 1

66. The coefficient of variation is
- the same as the variance
  - the square root of the variance
  - the square of the standard deviation
  - None of the other answers are correct.

ANS: D                      PTS: 1

67. The weights (in pounds) of a sample of 36 individuals were recorded and the following statistics were calculated

mean = 160                      range = 60  
mode = 165                      variance = 324  
median = 170

The coefficient of variation equals

- 0.1125%
  - 11.25%
  - 203.12%
  - 0.20312%
68. Which of the following is a measure of dispersion?
- percentiles
  - quartiles
  - interquartile range
  - all of these are measures of dispersion

ANS: B                      PTS: 1

69. Which of the following is not a measure of dispersion?
- the range
  - the 50th percentile
  - the standard deviation
  - the interquartile range

ANS: B                      PTS: 1

70. The measure of dispersion that is influenced most by extreme values is
- the variance
  - the standard deviation
  - the range
  - the interquartile range

ANS: C                      PTS: 1

71. The descriptive measure of dispersion that is based on the concept of a deviation about the mean is
- the range
  - the interquartile range
  - both the range and the interquartile range
  - the standard deviation

ANS: D                      PTS: 1

72. If two groups of numbers have the same mean, then their
- standard deviations must also be equal
  - medians must also be equal
  - modes must also be equal
  - None of the other answers are correct.

ANS: D                      PTS: 1

73. The descriptive measure that is not measured in the same units as the original data is the
- median
  - standard deviation
  - mode
  - variance

ANS: D                      PTS: 1

74. Which of the following symbols represents the size of the population?
- $\sigma^2$
  - $\sigma$
  - $\mu$
  - $N$

ANS: D                      PTS: 1

75. Which of the following symbols represents the size of the sample?
- $\sigma^2$
  - $\sigma$
  - $N$
  - $n$

ANS: D                      PTS: 1

76. Which of the following symbols represents the mean of the population?
- $\sigma^2$
  - $\sigma$
  - $\mu$
  - $\bar{x}$

ANS: C                      PTS: 1

77. Which of the following symbols represents the mean of the sample?
- $\sigma^2$
  - $\sigma$
  - $\mu$
  - $\bar{x}$

ANS: D                      PTS: 1

78. Which of the following symbols represents the variance of the population?
- $\sigma^2$
  - $\sigma$
  - $\mu$
  - $\bar{x}$

ANS: A                      PTS: 1

79. The symbol  $\sigma^2$  is used to represent the
- variance of the population
  - standard deviation of the sample
  - standard deviation of the population
  - None of the other answers are correct.

ANS: A                    PTS: 1

80. Which of the following symbols represents the standard deviation of the population?
- $\sigma^2$
  - $\sigma$
  - $\mu$
  - $\bar{x}$

ANS: B                    PTS: 1

81. The symbol  $\sigma$  is used to represent the
- variance of the population
  - standard deviation of the sample
  - standard deviation of the population
  - None of the other answers are correct.

ANS: C                    PTS: 1

82. The \_\_\_\_\_ denotes the number of standard deviations  $x_i$  is from the mean  $\bar{x}$ .
- range
  - median
  - z-score
  - third quartile

ANS: C                    PTS: 1

83. A(n) \_\_\_\_\_ is an unusually small or unusually large data value.
- sample statistic
  - median
  - z-score
  - outlier

ANS: D                    PTS: 1

84. \_\_\_\_\_ can be used to make statements about the proportion of data values that must be within a specified number of standard deviations of the mean.
- Chebyshev's theorem
  - The empirical rule
  - A five-number summary
  - A box plot

ANS: A                    PTS: 1

85. \_\_\_\_\_ can be used to determine the percentage of data values that must be within one, two, and three standard deviations of the mean for data having a bell-shaped distribution.
- Chebyshev's theorem
  - empirical rule
  - five-number summary

d. box plot

ANS: B                   PTS: 1

86. In a five-number summary, which of the following is not used for data summarization?
- a. the smallest value
  - b. the largest value
  - c. the median
  - d. the mean

ANS: D                   PTS: 1

87. A graphical summary of data that is based on a five-number summary is a
- a. histogram
  - b. stem-and-leaf display
  - c. scatter diagram
  - d. box plot

ANS: D                   PTS: 1

88. A numerical measure of linear association between two variables is the
- a. variance
  - b. covariance
  - c. standard deviation
  - d. coefficient of variation

ANS: B                   PTS: 1

89. Positive values of covariance indicate
- a. a positive variance of the  $x$  values
  - b. a positive variance of the  $y$  values
  - c. the standard deviation is positive
  - d. a positive relation between the  $x$  and the  $y$  variables

ANS: D                   PTS: 1

90. Excel's \_\_\_\_\_ function can be used to compute the sample covariance.
- a. MAX
  - b. COVARIANCE.S
  - c. VAR
  - d. CORREL

ANS: B                   PTS: 1

91. A numerical measure of linear association between two variables is the
- a. variance
  - b.  $z$ -score
  - c. correlation coefficient
  - d. None of the other answers are correct.

ANS: C                   PTS: 1

92. The correlation coefficient ranges between
- a. 0 and 1
  - b.  $-1$  and  $+1$
  - c. minus infinity and plus infinity

d. 1 and 100

ANS: B PTS: 1

93. The correlation coefficient
- a. is the same as the covariance
  - b. can be larger than 1
  - c. cannot be larger than 1
  - d. cannot be negative

ANS: C PTS: 1

94. Excel's \_\_\_\_\_ function can be used to compute the sample correlation coefficient.
- a. MAX
  - b. COVAR
  - c. VAR
  - d. CORREL

ANS: D PTS: 1

95. A mean computed in such a way that each data value is given a weight reflecting its importance is referred to as
- a. an important mean
  - b. a trimmed mean
  - c. a weighted mean
  - d. a heavy mean

ANS: C PTS: 1

96. In computing descriptive statistics from grouped data,
- a. data values are treated as if they occur at the midpoint of a class
  - b. the grouped data result is more accurate than the ungrouped result
  - c. the grouped data computations are used only when a population is being analyzed
  - d. All of these answers are correct.

ANS: A PTS: 1

97. When should measures of location and dispersion be computed from grouped data rather than from individual data values?
- a. as much as possible since computations are easier
  - b. only when individual data values are unavailable
  - c. whenever computer packages for descriptive statistics are unavailable
  - d. only when the data are from a population

ANS: B PTS: 1

98. An important numerical measure of the shape of a distribution is the
- a. correlation coefficient
  - b. variance
  - c. skewness
  - d. relative location

ANS: C PTS: 1

99. If the data distribution is symmetric, the skewness is
- a. 0

- b. .5
- c. 1
- d. None of the other answers is correct.

ANS: A                      PTS: 1

100. For data skewed to the left, the skewness is
- a. between 0 and .5
  - b. less than 1
  - c. positive
  - d. negative

ANS: D                      PTS: 1

101. When the data are positively skewed, the mean will usually be
- a. less than the median
  - b. greater than the median
  - c. less than the mode
  - d. greater than the mode

ANS: B                      PTS: 1

**PROBLEM**

1. The hourly wages of a sample of eight individuals is given below.

Individual	Hourly Wage (\$)
A	27
B	25
C	20
D	10
E	12
F	14
G	17
H	19

For the above sample, determine the following measures:

- a. The mean.
- b. The standard deviation.
- c. The 25th percentile.

ANS:

- a. 18
- b. 6
- c. 13

PTS: 1

2. In 1998, the average age of students at UTC was 22 with a standard deviation of 3.96. In 1999, the average age was 24 with a standard deviation of 4.08. In which year do the ages show a more dispersed distribution? Show your complete work and support your answer.

ANS:

C.V. for 1998 = 18% Therefore 1997 shows a more dispersed distribution.



C.V. for 1999 = 17%

PTS: 1

3. For the following data

5      7      9      11      15      19

Compute the following measures:

- The mean
- The variance
- The standard deviation
- The coefficient of variation
- The 25th percentile
- The median
- The 75th percentile

ANS:

- 11
- 27.2
- 5.22
- 47.41
- 7
- 10
- 15

PTS: 1

4. For the following data

20      18      17      23      22      19      21      17      23

Compute the following measures:

- The mean
- The variance
- The standard deviation
- The coefficient of variation
- The 25th percentile
- The median
- The 75th percentile

ANS:

- 20
- 5.75
- 2.4
- 11.99
- 18
- 20
- 22

PTS: 1

5. A private research organization studying families in various countries reported the following data for the amount of time 4-year old children spent alone with their fathers each day.

Country	Time with Dad (minutes)
Belgium	30
Canada	44
China	54
Finland	50
Germany	36
Nigeria	42
Sweden	46
United States	42

For the above sample, determine the following measures:

- The mean
- The standard deviation
- The mode
- The 75th percentile

ANS:

- 43
- 7.56
- 42
- 48

PTS: 1

6. The following data show the yearly salaries of football coaches at some state-supported universities.

University	Salary (\$1,000)
A	53
B	44
C	68
D	47
E	62
F	59
G	53
H	94

For the above sample, determine the following measures.

- The mean yearly salary
- The standard deviation
- The mode
- The median
- The 70th percentile

ANS:

- 60
- 15.8
- 53
- 56
- 62

PTS: 1

7. The amount of time that a sample of students spends watching television per day is given below.

Student	Time (minutes)
1	40
2	28
3	71
4	48
5	49
6	35
7	40
8	57

- Compute the mean.
- Compute the median.
- Compute the standard deviation.
- Compute the 75th percentile.

ANS:

- 46
- 44
- 13.5
- 53

PTS: 1

8. The number of hours worked per week for a sample of ten students is shown below.

Student	Hours
1	20
2	0
3	18
4	16
5	22
6	40
7	8
8	6
9	30
10	40

- Determine the median and explain its meaning.
- Compute the 70th percentile and explain its meaning.
- What is the mode of the above data? What does it signify?

ANS:

- 19; approximately 50% of the students work at least 19 hours
- 26; at least 70% of the students work less than or equal to 26 hours per week
- 40; the most frequent data element

PTS: 1

9. A researcher has obtained the number of hours worked per week during the summer for a sample of fifteen students.

40 25 35 30 20 40 30 20 40 10 30 20 10 5 20

Using this data set, compute the

- median
- mean
- mode
- 40th percentile
- range
- sample variance
- standard deviation

ANS:

- 25
- 25
- 20
- 20
- 35
- 128.571
- 11.339

PTS: 1

10. A sample of twelve families was taken. Each family was asked how many times per week they dine in restaurants. Their responses are given below.

2 1 0 2 0 2 1 2 0 2 1 2

Using this data set, compute the

- mode
- median
- mean
- range
- interquartile range
- variance
- standard deviation
- coefficient of variation

ANS:

- 2
- 1.5
- 1.25
- 2
- 1.5
- 0.75
- 0.866
- 69.28%

PTS: 1

11. A sample of 9 mothers was taken. The mothers were asked the age of their oldest child. You are given their responses below.

3      12      4      7      14      6      2      9      11

- Compute the mean.
- Compute the variance.
- Compute the standard deviation.
- Compute the coefficient of variation.
- Determine the 25th percentile.
- Determine the median
- Determine the 75th percentile.
- Determine the range.

ANS:

- 7.56
- 17.78
- 4.22
- 55.8
- 4.0
- 7.0
- 11
- 12

PTS: 1

12. A sample of 11 individuals shows the following monthly incomes.

Individual	Income (\$)
1	1,500
2	2,000
3	2,500
4	4,000
5	4,000
6	2,500
7	2,000
8	4,000
9	3,500
10	3,000
11	43,000

- What would be a representative measure of central location for the above data? Explain.
- Determine the mode.
- Determine the median.
- Determine the 60th percentile.
- Drop the income of individual number 11 and compute the standard deviation for the first 10 individuals.

ANS:

- Median, because the income of individual 11 is unusually high.
- 4000
- 3000
- 3500

e. 936.90

PTS: 1

13. Suppose annual salaries for sales associates from a particular store have a mean of \$32,500 and a standard deviation of \$2,500.
- Calculate and interpret the  $z$ -score for a sales associate who makes \$36,000.
  - Use Chebyshev's theorem to calculate the percentage of sales associates with salaries between \$26,250 and \$38,750.
  - Suppose that the distribution of annual salaries for sales associates at this store is bell-shaped. Use the empirical rule to calculate the percentage of sales associates with salaries between \$27,500 and \$37,500.
  - Use the empirical rule to determine the percentage of sales associates with salaries less than \$27,500.
  - Still suppose that the distribution of annual salaries for sales associates at this store is bell-shaped. A sales associate makes \$42,000. Should this salary be considered an outlier? Explain.

ANS:

- 1.4. This sales associate's annual salary is 1.4 standard deviations higher than the mean annual salary for sales associates from this store.
- 84%
- 95%
- 2.5%
- Yes because this salary is more than 3 standard deviations from the mean. It has a  $z$ -score of 3.8.

PTS: 1

14. Provide a five-number summary for the follow data.

115	191	153	194	236
184	216	185	183	202

ANS:

Smallest = 115,  
 $Q_1$  = 183,  
Median = 188,  
 $Q_3$  = 202,  
Largest = 236

PTS: 1

15. The following observations are given for two variables.

$y$	$x$
5	2
8	12
18	3
20	6
22	11
30	19
10	18

- Compute and interpret the sample covariance for the above data.
- Compute and interpret the sample correlation coefficient.

ANS:

- 19.286 (rounded). Since the covariance is positive, it indicates a positive relationship between  $x$  and  $y$ .
- 0.345. There is a positive relationship between  $x$  and  $y$ . The relationship is not very strong.

PTS: 1

16. The following data represent the daily demand ( $y$  in thousands of units) and the unit price ( $x$  in dollars) for a product.

Daily Demand ( $y$ )	Unit Price ( $x$ )
47	1
39	3
35	5
44	3
34	6
20	8
15	16
30	6

- Compute and interpret the sample covariance for the above data.
- Compute and interpret the sample correlation coefficient.

ANS:

- 160.14 (rounded). Since the covariance is negative, it indicates a negative relationship between  $x$  and  $y$ .
- 0.922. There is a strong negative relationship between daily demand and unit price.

PTS: 1

17. Compute the weighted mean for the following data.

$x_i$	Weight ( $w_i$ )
9	10
8	12
5	4
3	5
2	3

ANS:

6.676

PTS: 1

18. Compute the weighted mean for the following data.

$x_i$	Weight ( $w_i$ )
19	12

17	30
14	28
13	10
18	10

ANS:

16

PTS: 1

19. Paul, a freshman at a local college just completed 15 credit hours. His grade report is presented below.

Course	Credit Hours	Grades
Calculus	5	C
Biology	4	A
English	3	D
Music	2	B
P.E.	1	A

The local university uses a 4 point grading system, i.e., A = 4, B = 3, C = 2, D = 1, F = 0. Compute Paul's semester grade point average.

ANS:

2.6

PTS: 1

20. Consider the data in the following frequency distribution. Assume the data represent a population.

Class	Frequency
2 – 6	2
7 – 11	3
12 – 16	4
17 – 21	1

For the above data, compute the following.

- The mean
- The variance
- The standard deviation

ANS:

- 11
- 21
- 4.58

PTS: 1

21. The following frequency distribution shows the ACT scores of a sample of students:

Score	Frequency
14 – 18	2
19 – 23	5
24 – 28	12



For the above data, compute the following.

- The mean
- The standard deviation

ANS:

- 24
- 3.77

PTS: 1

22. The following is a frequency distribution of grades for a statistics examination.

Examination Grade	Frequency
40 – 49	3
50 – 59	5
60 – 69	11
70 – 79	22
80 – 89	15
90 – 99	6

Treating these data as a sample, compute the following:

- The mean
- The standard deviation
- The variance
- The coefficient of variation

ANS:

- 74.016
- 12.601
- 158.778
- 17.02%

PTS: 1

23. The starting salaries of a sample of college students are given below.

Starting Salary (\$1000s)	Frequency
10 – 14	2
15 – 19	3
20 – 24	5
25 – 29	7
30 – 34	2
35 – 39	1

- Compute the mean.
- Compute the variance.
- Compute the standard deviation.
- Compute the coefficient of variation.

ANS:

- a. 23.7
- b. 42.83
- c. 6.54
- d. 27.59

PTS: 1

24. The following frequency distribution shows the time (in minutes) that a sample of students uses the computer terminals per day.

Time (minutes)	Frequency
20 – 39	2
40 – 59	4
60 – 79	6
80 – 99	4
100 – 119	2

- a. Compute the mean.
- b. Compute the variance.
- c. Compute the standard deviation.
- d. Compute the coefficient of variation.

ANS:

- a. 69.5
- b. 564.54
- c. 23.76
- d. 34.19%

PTS: 1

25. A sample of charge accounts at a local drug store revealed the following frequency distribution of unpaid balances.

Unpaid Balance (\$)	Frequency
10 – 29	5
30 – 49	10
50 – 69	6
70 – 89	9
90 – 109	20

- a. Determine the mean unpaid balance.
- b. Determine the standard deviation.
- c. Compute the coefficient of variation.

ANS:

- a. 71.1
- b. 28.88
- c. 40.62%

PTS: 1

26. The following is a frequency distribution for the ages of a sample of employees at a local company.

Age	Frequency
30 – 39	2
40 – 49	3
50 – 59	7
60 – 69	5
70 – 79	1

- Determine the average age for the sample.
- Compute the variance.
- Compute the standard deviation.
- Compute the coefficient of variation.

ANS:

- 54.5
- 117.65
- 10.85
- 19.91%

PTS: 1

27. Del Michaels had a successful morning, or so he thinks, selling 1300 surplus notebook computers over the telephone to three commercial customers. The three customers were not equally skillful at negotiating a low unit price. Customer A bought 600 computers for \$1252 each, B bought 300 units at \$1310 each, and C bought 400 at \$1375 each.
- What is the average unit price at which Del sold the 1300 computers?
  - Del's manager told Del he expected him to sell, by the end of the day, a total of 2500 surplus computers at an average price of \$1312 each. What is the average unit price at which Del must sell the remaining 1200 computers?

ANS:

- \$1303.23
- \$1321.50

PTS: 1

28. Missy Walters owns a mail-order business specializing in baby clothes. She is considering offering her customers a discount on shipping charges based on the dollar-amount of the mail order. Before Missy decides the discount policy, she needs a better understanding of the dollar-amount distribution of the mail orders she receives. Missy had an assistant randomly select 50 recent orders and record the value, to the nearest dollar, of each order as shown below.

136	281	226	123	178	445	231	389	196	175
211	162	212	241	182	290	434	167	246	338
194	242	368	258	323	196	183	209	198	212
277	348	173	409	264	237	490	222	472	248
231	154	166	214	311	141	159	362	189	260

- Determine the mean, median, and mode for this data set.
- Determine the 80<sup>th</sup> percentile.
- Determine the first quartile.

- d. Determine the range and interquartile range.
- e. Determine the sample variance, sample standard deviation, and coefficient of variation.
- f. Determine the  $z$ -scores for the minimum and maximum values in the data set.

ANS:

- a. mean = 251.46, median = 228.5, modes = 196 and 231
- b. 331.5
- c. 183
- d. range = 367, interquartile range = 107
- e. variance = 8398.5, standard deviation = 91.64, coefficient of variation = 36.44
- f. minimum's  $z$ -score = -1.40, maximum's  $z$ -score = 2.60

PTS: 1

29. Ron Butler, a custom home builder, is looking over the expenses he incurred for a house he just completed constructing. For the purpose of pricing future construction projects, he would like to know the average wage (\$/hour) he paid the workers he employed. Listed below are the categories of worker he employed, along with their respective wage and total hours worked. What is the average wage (\$/hour) he paid the workers?

<u>Worker</u>	<u>Wage (\$/hr)</u>	<u>Total Hours</u>
Carpenter	21.60	520
Electrician	28.72	230
Laborer	11.80	410
Painter	19.75	270
Plumber	24.16	160

ANS:

\$20.05

PTS: 1