Essentials of Business Analytics 2nd edition Camm Test Bank

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CH 2 - Descriptive Statistics

1. A quantity of interest that can take on different values is known as a(n)

a. variable. b. parameter.
c. sample. d. observation.

ANSWER: a
RATIONALE: A characteristic or a quantity of interest that can take on different values is known as a variable.
POINTS: 1
DIFFICULTY: Easy
REFERENCES: OVERVIEW OF USING DATA: DEFINITIONS AND GOALS, Page 18
NATIONAL STANDARDS: United States - BUSPROG: Analytic skills - and DISC: Descriptive Statistics
KEYWORDS: Bloom's: Knowledge

2. A set of values corresponding to a set of variables is defined as a(n)

a. quantity. b. event.
c. factor. d. observation.

ANSWER: d
RATIONALE: An observation is a set of values corresponding to a set of variables.
POINTS: 1
DIFFICULTY: Easy
REFERENCES: OVERVIEW OF USING DATA: DEFINITIONS AND GOALS, Page 18
NATIONAL STANDARDS: United States - BUSPROG: Analytic skills - and DISC: Descriptive Statistics
KEYWORDS: Bloom's: Knowledge

3. The difference in a variable measured over observations (time, customers, items, etc.) is known as

a. observed differences. b. variation.
c. variable change. d. descriptive analytics.

ANSWER: b
RATIONALE: Variation is the difference in a variable measured over observations (time, customers, items, etc.).
POINTS: 1
DIFFICULTY: Moderate
REFERENCES: OVERVIEW OF USING DATA: DEFINITIONS AND GOALS, Page 18
NATIONAL STANDARDS: United States - BUSPROG: Analytic skills - and DISC: Descriptive Statistics
KEYWORDS: Bloom's: Knowledge

4. _____ act(s) as a representative of the population.

a. The analytics b. The variance
c. A sample d. The random variables

ANSWER: c
RATIONALE: A subset of the population is known as a sample, and it acts as a representative of the population.
POINTS: 1
DIFFICULTY: Easy
REFERENCES: TYPES OF DATA, Page 20
NATIONAL STANDARDS: United States - BUSPROG: Analytic skills - and DISC: Descriptive Statistics

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KEYWORDS: Bloom's: Knowledge

5. The act of collecting data that are representative of the population data is called

a. random sampling. b. sample data.
c. population sampling. d. applications of business analytics.

ANSWER: a
RATIONALE: A representative sample can be gathered by random sampling of the population data.
POINTS: 1
DIFFICULTY: Easy
REFERENCES: TYPES OF DATA, Page 20
NATIONAL STANDARDS: United States - BUSPROG: Analytic skills - and DISC: Descriptive Statistics
KEYWORDS: Bloom's: Knowledge

6. The letter grades of business analysis students is recorded by a professor (4=A, 3=B, 2=C, 1=D). This variable's classification

a. is quantitative data. b. cannot be determined.
c. is categorical data. d. is nominal data.

ANSWER: c
RATIONALE: If arithmetic operations cannot be performed on the data, they are considered categorical data.
POINTS: 1
DIFFICULTY: Easy
REFERENCES: TYPES OF DATA, Page 20
NATIONAL STANDARDS: United States - BUSPROG: Analytic skills - and DISC: Descriptive Statistics
KEYWORDS: Bloom's: Application

7. The data on the time taken by 10 students in a class to complete an exam is an example of what type of data?

a. Cannot be determined b. Categorical data
c. Time series data d. Quantitative data

ANSWER: d
RATIONALE: Data are considered quantitative data if numeric and arithmetic operations, such as addition, subtraction, multiplication, and division, can be performed on them.
POINTS: 1
DIFFICULTY: Easy
REFERENCES: TYPES OF DATA, Page 20
NATIONAL STANDARDS: United States - BUSPROG: Analytic skills - and DISC: Descriptive Statistics
KEYWORDS: Bloom's: Knowledge

8. _____ are collected from several entities at the same point in time.

a. Time series data b. Categorical and quantitative data
c. Cross-sectional data d. Random data

ANSWER: c
RATIONALE: Cross-sectional data are collected from several entities at the same, or approximately the same, point in time.
POINTS: 1
DIFFICULTY: Moderate

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REFERENCES: TYPES OF DATA, Page 20
NATIONAL STANDARDS: United States - BUSPROG: Analytic skills - and DISC: Descriptive Statistics
KEYWORDS: Bloom's: Knowledge

9. Data collected from several entities over a period of time (minutes, hours, days, etc.) are called
a. categorical and quantitative data. b. time series data.
c. source data. d. cross-sectional data.
ANSWER: b
RATIONALE: Data that are collected over a period of time (minutes, hours, days, months, years, etc.) are known as time series data.
POINTS: 1
DIFFICULTY: Easy
REFERENCES: TYPES OF DATA, Page 20
NATIONAL STANDARDS: United States - BUSPROG: Analytic skills - and DISC: Descriptive Statistics
KEYWORDS: Bloom's: Knowledge

10. In a(n) _____, one or more variables are identified and controlled or manipulated so that data can be obtained about how they influence the variable of interest identified first.
a. experimental study b. observational study
c. categorical study d. variable study
ANSWER: a
RATIONALE: In an experimental study, a variable of interest is first identified. Then one or more other variables are identified and controlled or manipulated so that data can be obtained about how they influence the variable of interest.
POINTS: 1
DIFFICULTY: Easy
REFERENCES: TYPES OF DATA, Page 20
NATIONAL STANDARDS: United States - BUSPROG: Analytic skills - and DISC: Descriptive Statistics
KEYWORDS: Bloom's: Knowledge

11. The data collected from the customers in restaurants about the quality of food is an example of a(n)
a. variable study. b. cross-sectional study.
c. experimental study. d. observational study.
ANSWER: d
RATIONALE: Nonexperimental, or observational, studies make no attempt to control the variables of interest. Some restaurants use observational studies to obtain data about customer opinions on the quality of food, quality of service, atmosphere, and so on.
POINTS: 1
DIFFICULTY: Moderate
REFERENCES: TYPES OF DATA, Page 21
NATIONAL STANDARDS: United States - BUSPROG: Analytic skills - and DISC: Descriptive Statistics
KEYWORDS: Bloom's: Application

12. When working with large spreadsheets with many rows of data, it can be helpful to _____ the data to better find, view, or manage subsets of data.
a. split b. sort and filter

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c. chart d. manipulate

ANSWER: b

RATIONALE: Excel contains an option to sort and filter data so that one can identify patterns of the data more easily.

POINTS: 1

DIFFICULTY: Easy

REFERENCES: MODIFYING DATA IN EXCEL, Page 23

NATIONAL STANDARDS: United States - BUSPROG: Analytic skills - and DISC: Descriptive Statistics

KEYWORDS: Bloom's: Comprehension

13. A summary of data that shows the number of observations in each of several nonoverlapping bins is called a(n)

a. frequency distribution. b. sample summary.

c. bin distribution. d. observed distribution.

ANSWER: a

RATIONALE: A frequency distribution is a summary of data that shows the number (frequency) of observations in each of several nonoverlapping classes, typically referred to as bins, when dealing with distributions.

POINTS: 1

DIFFICULTY: Easy

REFERENCES: CREATING DISTRIBUTIONS FROM DATA, Page 29

NATIONAL STANDARDS: United States - BUSPROG: Analytic skills - and DISC: Descriptive Statistics

KEYWORDS: Bloom's: Knowledge

14. Which of the following gives the proportion of items in each bin?

a. Frequency b. Class size

c. Relative frequency d. Bin proportion

ANSWER: c

RATIONALE: The relative frequency of a bin equals the fraction or proportion of items belonging to a class.

POINTS: 1

DIFFICULTY: Easy

REFERENCES: CREATING DISTRIBUTIONS FROM DATA, Page 31

NATIONAL STANDARDS: United States - BUSPROG: Analytic skills - and DISC: Descriptive Statistics

KEYWORDS: Bloom's: Knowledge

15. Compute the relative frequencies for the data given in the table below:

Grades	Number of students
A	16
B	28
C	33
D	13
Total	90

a. 0.31, 0.14, 0.37, 0.18 b. 0.37, 0.14, 0.31, 0.18

c. 0.16, 0.28, 0.33, 0.13 d. 0.18, 0.31, 0.37, 0.14

ANSWER: d

RATIONALE: The relative frequency of a bin equals the fraction or proportion of items belonging to a class.

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Relative frequency of a bin = Frequency of the bin /n.

POINTS: 1
DIFFICULTY: Moderate
REFERENCES: CREATING DISTRIBUTIONS FROM DATA, Page 31
NATIONAL STANDARDS: United States - BUSPROG: Analytic skills - and DISC: Descriptive Statistics
KEYWORDS: Bloom's: Application

16. Consider the data below. What percentage of students scored grade C?

Grades	Number of students
A	16
B	28
C	33
D	13
Total	90

a. 33% b. 31%
c. 37% d. 28%

ANSWER: c
RATIONALE: A percent frequency distribution summarizes the percent frequency of the data for each bin. The percent frequency of a bin is the relative frequency multiplied by 100.
POINTS: 1
DIFFICULTY: Moderate
REFERENCES: CREATING DISTRIBUTIONS FROM DATA, Page 31
NATIONAL STANDARDS: United States - BUSPROG: Analytic skills - and DISC: Descriptive Statistics
KEYWORDS: Bloom's: Application

17. Which of the following are necessary to be determined to define the classes for a frequency distribution with quantitative data?

a. Number of nonoverlapping bins, width of each bin, and bin limits
b. Width of each bin and bin lower limits
c. Number of overlapping bins, width of each bin, and bin upper limits
d. Width of each bin and number of bins

ANSWER: a
RATIONALE: The three steps necessary to define the classes for a frequency distribution with quantitative data are: determine the number of nonoverlapping bins, determine the width of each bin, and determine the bin limits.
POINTS: 1
DIFFICULTY: Moderate
REFERENCES: CREATING DISTRIBUTIONS FROM DATA, Page 31
NATIONAL STANDARDS: United States - BUSPROG: Analytic skills - and DISC: Descriptive Statistics
KEYWORDS: Bloom's: Comprehension

18. The goal regarding using an appropriate number of bins is to show the

a. number of observations. b. number of variables.
c. variation in the data. d. correlation in the data.

ANSWER: c

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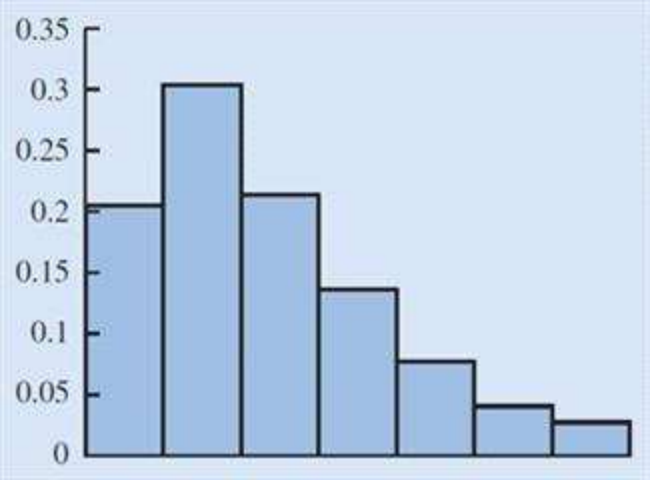
RATIONALE: The goal is to use enough bins to show the variation in the data, but not so many classes that some contain only a few data items.
POINTS: 1
DIFFICULTY: Moderate
REFERENCES: CREATING DISTRIBUTIONS FROM DATA, Page 32
NATIONAL STANDARDS: United States - BUSPROG: Analytic skills - and DISC: Descriptive Statistics
KEYWORDS: Bloom's: Comprehension

19. A _____ is a graphical summary of data previously summarized in a frequency distribution.

a. box plot b. histogram
c. line chart d. scatter chart

ANSWER: b
RATIONALE: A common graphical presentation of quantitative data is a histogram. This graphical summary can be prepared for data previously summarized in a frequency, a relative frequency, or a percent frequency distribution.
POINTS: 1
DIFFICULTY: Easy
REFERENCES: CREATING DISTRIBUTIONS FROM DATA, Page 34
NATIONAL STANDARDS: United States - BUSPROG: Analytic skills - and DISC: Descriptive Statistics
KEYWORDS: Bloom's: Knowledge

20. Identify the shape of the distribution in the figure below.



a. Moderately skewed left b. Symmetric
c. Approximately Bell Shaped d. Moderately skewed right

ANSWER: d
RATIONALE: A histogram is said to be skewed to the right if its tail extends farther to the right than to the left. The given histogram is, therefore, moderately skewed to the right.
POINTS: 1
DIFFICULTY: Moderate
REFERENCES: CREATING DISTRIBUTIONS FROM DATA, Page 37
NATIONAL STANDARDS: United States - BUSPROG: Analytic skills - and DISC: Descriptive Statistics
KEYWORDS: Bloom's: Knowledge

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21. The _____ shows the number of data items with values less than or equal to the upper class limit of each class.

a. cumulative frequency distribution b. frequency distribution
c. percent frequency distribution d. relative frequency distribution

ANSWER: a
RATIONALE: The cumulative frequency distribution shows the number of data items with values less than or equal to the upper class limit of each class.
POINTS: 1
DIFFICULTY: Easy
REFERENCES: CREATING DISTRIBUTIONS FROM DATA, Page 38
NATIONAL STANDARDS: United States - BUSPROG: Analytic skills - and DISC: Descriptive Statistics
KEYWORDS: Bloom's: Knowledge

22. The _____ is a point estimate of the population mean for the variable of interest.

a. sample mean b. median
c. sample d. geometric mean

ANSWER: a
RATIONALE: The sample mean is a point estimate of the (typically unknown) population mean for the variable of interest.
POINTS: 1
DIFFICULTY: Moderate
REFERENCES: MEASURES OF LOCATION, Page 39
NATIONAL STANDARDS: United States - BUSPROG: Analytic skills - and DISC: Descriptive Statistics
KEYWORDS: Bloom's: Knowledge

23. Compute the mean of the following data.

56, 42, 37, 29, 45, 51, 30, 25, 34, 57

a. 42.8 b. 52.1
c. 40.6 d. 39.4

ANSWER: c
RATIONALE:

$$Mean = \frac{56 + 42 + 37 + 29 + 45 + 51 + 30 + 25 + 24 + 57}{10} = \frac{406}{10} = 40.6$$

The mean provides a measure of central location for the data. It is computed as:

POINTS: 1
DIFFICULTY: Moderate
REFERENCES: MEASURES OF LOCATION, Page 39
NATIONAL STANDARDS: United States - BUSPROG: Analytic skills - and DISC: Descriptive Statistics
KEYWORDS: Bloom's: Application

24. Compute the median of the following data.

32, 41, 36, 24, 29, 30, 40, 22, 25, 37

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a. 28 b. 31
c. 40 d. 34

ANSWER: b

RATIONALE: The median is the value in the middle when the data are arranged in ascending order (smallest to largest value).

$$Median = average\ of\ middle\ two\ values = \frac{30 + 32}{2} = 31.$$

POINTS: 1
DIFFICULTY: Moderate
REFERENCES: MEASURES OF LOCATION, Page 40
NATIONAL STANDARDS: United States - BUSPROG: Analytic skills - and DISC: Descriptive Statistics
KEYWORDS: Bloom's: Application

25. Compute the mode for the following data.

12, 16, 19, 10, 12, 11, 21, 12, 21, 10

a. 21 b. 11
c. 12 d. 10

ANSWER: c

RATIONALE: The mode is the value that occurs most frequently in a data set. The value 12 occurs with the greatest frequency. Therefore, the mode is 12.

POINTS: 1
DIFFICULTY: Moderate
REFERENCES: MEASURES OF LOCATION, Page 41
NATIONAL STANDARDS: United States - BUSPROG: Analytic skills - and DISC: Descriptive Statistics
KEYWORDS: Bloom's: Application

26. Compute the geometric mean for the following data on growth factors of an investment for 10 years.

1.10, 0.50, 0.70, 1.21, 1.25, 1.12, 1.16, 1.11, 1.13, 1.22

a. 1.0221 b. 1.0148
c. 1.0363 d. 1.1475

ANSWER: b

RATIONALE: The geometric mean is a measure of location that is calculated by finding the *n*th root of the product of *n* values.

$$Geometric\ mean = \sqrt[10]{(1.1)(0.5)(0.7)(1.21)(1.25)(1.12)(1.16)(1.11)(1.13)(1.22)} = 1.0148$$

POINTS: 1
DIFFICULTY: Moderate
REFERENCES: MEASURES OF LOCATION, Page 42
NATIONAL STANDARDS: United States - BUSPROG: Analytic skills - and DISC: Descriptive Statistics

KEYWORDS: Bloom's: Application

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27. The simplest measure of variability is the

a. variance. b. standard deviation.
c. coefficient of variation. d. range.

ANSWER: d
RATIONALE: The simplest measure of variability is the range.
POINTS: 1
DIFFICULTY: Easy
REFERENCES: MEASURES OF VARIABILITY, Page 45
NATIONAL STANDARDS: United States - BUSPROG: Analytic skills - and DISC: Descriptive Statistics
KEYWORDS: Bloom's: Knowledge

28. The variance is based on the

a. deviation about the median. b. number of variables.
c. deviation about the mean. d. correlation in the data.

ANSWER: c
RATIONALE: The variance is based on the deviation about the mean, which is the difference between the value of each observation (x_i) and the mean.
POINTS: 1
DIFFICULTY: Easy
REFERENCES: MEASURES OF VARIABILITY, Page 45
NATIONAL STANDARDS: United States - BUSPROG: Analytic skills - and DISC: Descriptive Statistics
KEYWORDS: Bloom's: Knowledge

29. Use technology to compute the standard deviation for the following sample data.

32, 41, 36, 24, 29, 30, 40, 22, 25, 37

a. 5.96 b. 6.41
c. 5.42 d. 6.75

ANSWER: d
RATIONALE: The standard deviation is defined to be the positive square root of the variance and can be calculated using the Excel function = STDEV.S( ).
POINTS: 1
DIFFICULTY: Moderate
REFERENCES: MEASURES OF VARIABILITY, Page 47
NATIONAL STANDARDS: United States - BUSPROG: Analytic skills - and DISC: Descriptive Statistics
KEYWORDS: Bloom's: Application

30. Compute the coefficient of variation for the following sample data.

32, 41, 36, 24, 29, 30, 40, 22, 25, 37

a. 18.64% b. 21.36%
c. 20.28% d. 21.67%

ANSWER: b
RATIONALE: The coefficient of variation indicates how large the standard deviation is relative to the mean.

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The coefficient of variation is (6.75/31.6 × 100) = 21.36%.

POINTS: 1
DIFFICULTY: Moderate
REFERENCES: MEASURES OF VARIABILITY, Page 48
NATIONAL STANDARDS: United States - BUSPROG: Analytic skills - and DISC: Descriptive Statistics
KEYWORDS: Bloom's: Application

31. Compute the 50^{th} percentile for the following data.

10, 15, 17, 21, 25, 12, 16, 11, 13, 22

a. 18.6 b. 13.3
c. 15.5 d. 17.7

ANSWER: c
RATIONALE: A percentile is the value of a variable at which a specified (approximate) percentage of observations are below that value. 50^{th} percentile = median = 15.5.
POINTS: 1
DIFFICULTY: Moderate
REFERENCES: ANALYZING DISTRIBUTIONS, Page 48
NATIONAL STANDARDS: United States - BUSPROG: Analytic skills - and DISC: Descriptive Statistics
KEYWORDS: Bloom's: Application

32. Compute the third quartile for the following data.

10, 15, 17, 21, 25, 12, 16, 11, 13, 22

a. 21.25 b. 15.5
c. 21.5 d. 11.75

ANSWER: a
RATIONALE: Quartiles divide data into four parts, with each part containing approximately one-fourth, or 25 percent, of the observations. This can be calculated with the Excel function =QUARTILE.EXC(range,3) = 21.25.
POINTS: 1
DIFFICULTY: Moderate
REFERENCES: ANALYZING DISTRIBUTIONS, Page 49
NATIONAL STANDARDS: United States - BUSPROG: Analytic skills - and DISC: Descriptive Statistics
KEYWORDS: Bloom's: Application

33. Compute the IQR for the following data.

10, 15, 17, 21, 25, 12, 16, 11, 13, 22

a. 6.25 b. 7.75
c. 5.14 d. 9.50

ANSWER: d
RATIONALE: The difference between the third and first quartiles is often referred to as the interquartile range, or IQR. IQR = 21.25 – 11.75 = 9.50.

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POINTS: 1
DIFFICULTY: Moderate
REFERENCES: ANALYZING DISTRIBUTIONS, Page 50
NATIONAL STANDARDS: United States - BUSPROG: Analytic skills - and DISC: Descriptive Statistics
KEYWORDS: Bloom's: Application

34. A _____ determines how far a particular value is from the mean relative to the data set's standard deviation.

a. coefficient of variation b. *z*-score
c. variance d. percentile

ANSWER: b
RATIONALE: A *z*-score helps us determine how far a particular value is from the mean relative to the data set's standard deviation.
POINTS: 1
DIFFICULTY: Easy
REFERENCES: ANALYZING DISTRIBUTIONS, Page 50
NATIONAL STANDARDS: United States - BUSPROG: Analytic skills - and DISC: Descriptive Statistics
KEYWORDS: Bloom's: Knowledge

35. For data having a bell-shaped distribution, approximately _____ percent of the data values will be within one standard deviation of the mean.

a. 95 b. 66
c. 68 d. 97

ANSWER: c
RATIONALE: Approximately 68 percent of the data values will be within one standard deviation of the mean for data having a bell-shaped distribution.
POINTS: 1
DIFFICULTY: Easy
REFERENCES: ANALYZING DISTRIBUTIONS, Page 51
NATIONAL STANDARDS: United States - BUSPROG: Analytic skills - and DISC: Descriptive Statistics
KEYWORDS: Bloom's: Knowledge

36. Any data value with a *z*-score less than –3 or greater than +3 is considered to be a(n)

a. outlier. b. usual value.
c. whisker. d. *z*-score value.

ANSWER: a
RATIONALE: Any data value with a *z*-score less than –3 or greater than +3 is treated as an outlier.
POINTS: 1
DIFFICULTY: Easy
REFERENCES: ANALYZING DISTRIBUTIONS, Page 53
NATIONAL STANDARDS: United States - BUSPROG: Analytic skills - and DISC: Descriptive Statistics
KEYWORDS: Bloom's: Knowledge

37. Which of the following graphs provides information on outliers and IQR of a data set?

a. Histogram b. Line chart

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c. Scatter chart d. Box plot

ANSWER: d

RATIONALE: A box plot is a graphical summary of the distribution of data, and it is developed from the quartiles for a data set. Therefore, the information on the outliers and IQR can be obtained from a box plot.

POINTS: 1

DIFFICULTY: Easy

REFERENCES: ANALYZING DISTRIBUTIONS, Page 53

NATIONAL STANDARDS: United States - BUSPROG: Analytic skills - and DISC: Descriptive Statistics

KEYWORDS: Bloom's: Comprehension

38. If covariance between two variables is near 0, it implies that

a. a positive relationship exists between the variables.

b. the variables are not linearly related.

c. the variables are negatively related.

d. the variables are strongly related.

ANSWER: b

RATIONALE: If the covariance between two variables is near 0, then the variables are not linearly related.

POINTS: 1

DIFFICULTY: Easy

REFERENCES: MEASURES OF ASSOCIATION BETWEEN TWO VARIABLES, Page 57

NATIONAL STANDARDS: United States - BUSPROG: Analytic skills - and DISC: Descriptive Statistics

KEYWORDS: Bloom's: Comprehension

39. The correlation coefficient will always take values

a. greater than 0. b. between –1 and 0.

c. between –1 and +1. d. less than –1.

ANSWER: c

RATIONALE: The correlation coefficient will always take values between –1 and +1.

POINTS: 1

DIFFICULTY: Easy

REFERENCES: MEASURES OF ASSOCIATION BETWEEN TWO VARIABLES, Page 58

NATIONAL STANDARDS: United States - BUSPROG: Analytic skills - and DISC: Descriptive Statistics

KEYWORDS: Bloom's: Knowledge

40. Scores on Ms. Bond's test have a mean of 70 and a standard deviation of 11. Michelle has a score of 48. Convert Michelle's score to a *z*-score. (Round to two decimal places if necessary.)

a. 2

b. 41.64

c. –2

d. 1.33

ANSWER: c

RATIONALE: *z*-score = (sample – mean)/standard deviation (48 – 70)/11 = –2

POINTS: 1

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DIFFICULTY: Moderate
REFERENCES: ANALYZING DISTRIBUTIONS, Page 50
NATIONAL STANDARDS: United States - BUSPROG: Analytic skills - and DISC: Descriptive Statistics
KEYWORDS: Blooms: Application

41. Scores on Ms. Nash's test have a mean of 64 and a standard deviation of 9. Steve has a score of 52. Convert Steve's score to a *z*-score. (Round to two decimal places if necessary.)

a. 1.33
b. 58.2
c. –2
d. –1.33

ANSWER: d
RATIONALE: *z*-score = (sample – mean)/standard deviation (52 – 64)/9 = –1.33
POINTS: 1
DIFFICULTY: Moderate
REFERENCES: ANALYZING DISTRIBUTIONS, Page 50
NATIONAL STANDARDS: United States - BUSPROG: Analytic skills - and DISC: Descriptive Statistics
KEYWORDS: Blooms: Application

42. Scores on Ms. Bond's test have a mean of 70 and a standard deviation of 11. David has a score of 52 on Ms. Bond's test. Scores on Ms. Nash's test have a mean of 64 and a standard deviation of 6. Steven has a score of 52 on Ms. Nash's test. Which student has the higher standardized score?

a. David's standardized score is -1.64 and Steven's standardized scores -2.00. Therefore, David has the higher standardized score.
b. David's standardized score is -1.64 and Steven's standardized scores -2.00. Therefore, Steven has the higher standardized score.
c. David's standardized score is 1.64 and Steven's standardized scores 2.00. Therefore, Steven has the higher standardized score.
d. Cannot be determined with the information provided.

ANSWER: b
RATIONALE: David's standardized score is (52 – 70)/11 = –1.64 and Steven's standardized scores is (52 – 64)/6 = –2.00. Therefore, David has the higher standardized score.
POINTS: 1
DIFFICULTY: Challenging
REFERENCES: ANALYZING DISTRIBUTIONS, Page 50
NATIONAL STANDARDS: United States - BUSPROG: Analytic skills - and DISC: Descriptive Statistics
KEYWORDS: Blooms: Application

43. A student willing to participate in a debate competition is required to fill out a registration form. State whether each of the following information about the participant provides categorical or quantitative data.
a. What is your date of birth?
b. Have you participated in any debate competition previously?
c. If yes, in how many debate competitions have you participated so far?
d. Have you won any of the competitions?
e. If yes, how many have you won?

ANSWER:
a. Quantitative

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b. Categorical
c. Quantitative
d. Categorical
e. Quantitative

POINTS: 1
DIFFICULTY: Easy
REFERENCES: TYPES OF DATA, Page 20
NATIONAL STANDARDS: United States - BUSPROG: Analytic skills - and DISC: Descriptive Statistics
KEYWORDS: Bloom's: Application

44. The following table provides information on the number of billionaires in a country and the continents on which these countries are located.

Nationality	Continent	Number of Billionaires
United States	North America	426
Brazil	South America	38
Russia	Europe	105
Mexico	North America	37
India	Asia	54
Turkey	Europe	40
United Kingdom	Europe	31
Hong Kong	Asia	39
Germany	Europe	57
Canada	North America	28
China	Asia	120

a. Sort the countries from largest to smallest based on the number of billionaires. What are the top five countries according to the number of billionaires?
b. Filter the countries to display only the countries located in North America.

ANSWER: a.

Nationality	Continent	Number of Billionaires
United States	North America	426
China	Asia	120
Russia	Europe	105
Germany	Europe	57
India	Asia	54
Turkey	Europe	40
Hong Kong	Asia	39
Brazil	South America	38
Mexico	North America	37
United Kingdom	Europe	31
Canada	North America	28

The top five countries with the greater number of billionaires are United States, China, Russia, Germany, and India.
b.

Nationality	Continent	Number of Billionaires
United States	North America	426
Mexico	North America	37
Canada	North America	28

POINTS: 1
DIFFICULTY: Moderate

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REFERENCES: MODIFYING DATA IN EXCEL, Pages 23-24
NATIONAL STANDARDS: United States - BUSPROG: Analytic skills - and DISC: Descriptive Statistics
KEYWORDS: Bloom's: Application

45. The data on the percentage of visitors in the previous and current years at 12 well-known national parks of the United States are given below.

National Parks	Percentage of visitors previous year	Percentage of visitors current year
The Smokies	78.2%	84.2%
The Grand Canyon	83.5%	81.6%
Theodore Roosevelt	81.6%	84.8%
Yosemite	74.2%	78.4%
Yellowstone	77.9%	76.2%
Olympic	86.4%	88.6%
The Colorado Rockies	84.3%	85.4%
Zion	76.7%	78.9%
The Grand Tetons	84.6%	87.8%
Cuyahoga Valley	85.1%	86.7%
Acadia	79.2%	82.6%
Shenandoah	72.9%	79.2%

a. Sort the parks in descending order by their current year's visitor percentage. Which park has the highest number of visitors in the current year? Which park has the lowest number of visitors in the current year?
b. Calculate the change in visitor percentage from the previous to the current year for each park. Use Excel's conditional formatting to highlight the parks whose visitor percentage decreased from the previous year to the current year.
c. Use Excel's conditional formatting tool to create data bars for the change in visitor percentage from the previous year to the current year for each park calculated in part b.

ANSWER:

a. The sorted list of parks for the current year appears as below:

National Parks	Percentage of visitors previous year	Percentage of visitors current year
Olympic	86.4%	88.6%
The Grand Tetons	84.6%	87.8%
Cuyahoga Valley	85.1%	86.7%
The Colorado Rockies	84.3%	85.4%
Theodore Roosevelt	81.6%	84.8%
The Smokies	78.2%	84.2%
Acadia	79.2%	82.6%
The Grand Canyon	83.5%	81.6%
Shenandoah	72.9%	79.2%
Zion	76.7%	78.9%
Yosemite	74.2%	78.4%
Yellowstone	77.9%	76.2%

Olympic has the highest number of visitors in the current year, and Yellowstone has the lowest number of visitors in the current year.

b.

National Parks	Percentage of visitors previous year	Percentage of visitors current year	Change in visitor percentage
The Smokies	78.2%	84.2%	6.00%

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The Grand Canyon	83.5%	81.6%	-1.90%
Theodore Roosevelt	81.6%	84.8%	3.20%
Yosemite	74.2%	78.4%	4.20%
Yellowstone	77.9%	76.2%	-1.70%
Olympic	86.4%	88.6%	2.20%
The Colorado Rockies	84.3%	85.4%	1.10%
Zion	76.7%	78.9%	2.20%
The Grand Tetons	84.6%	87.8%	3.20%
Cuyahoga Valley	85.1%	86.7%	1.60%
Acadia	79.2%	82.6%	3.40%
Shenandoah	72.9%	79.2%	6.30%

c. The output using Excel's conditional formatting tool that created data bars for the change in visitor percentage from the previous year to the current year for each park appears as below.



National Parks	Percentage of visitor's previous year	Percentage of visitor's current year	Change in visitor's percentage
The Smokies	78.2%	84.2%	6.00%
The Grand Canyon	83.5%	81.6%	-1.90%
Theodore Roosevelt	81.6%	84.8%	3.20%
Yosemite	74.2%	78.4%	4.20%
Yellowstone	77.9%	76.2%	-1.70%
Olympic	86.4%	88.6%	2.20%
The Colorado Rockies	84.3%	85.4%	1.10%
Zion	76.7%	78.9%	2.20%
The Grand Tetons	84.6%	87.8%	3.20%
Cuyahoga Valley	85.1%	86.7%	1.60%
Acadia	79.2%	82.6%	3.40%
Shenandoah	72.9%	79.2%	6.30%

POINTS: 1
DIFFICULTY: Moderate
REFERENCES: MODIFYING DATA IN EXCEL, Pages 23-28
NATIONAL STANDARDS: United States - BUSPROG: Analytic skills - and DISC: Descriptive Statistics
KEYWORDS: Bloom's: Application

46. The partial relative frequency distribution is given below:

Group	Relative Frequency
1	0.15
2	0.32
3	0.29
4	

a. What is the relative frequency of group 4?
b. The total sample size is 400. What is the frequency of group 4?
c. Show the frequency distribution.
d. Show the percent frequency distribution.

ANSWER:

a. The relative frequency of group 4 is obtained as $1.00 - 0.15 - 0.32 - 0.29 = 0.24$.
b. If the total sample size is 400, the frequency of group 4 is obtained as $0.24 \times 400 = 96$.
c.

Group	Relative Frequency	Frequency
1	0.15	60
2	0.32	128
3	0.29	116
4	0.24	96

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Total	**1.00**	**400**

d.

Group	**Relative Frequency**	**% Frequency**
1	0.15	15
2	0.32	32
3	0.29	29
4	0.24	24
Total	**1.00**	**100**

POINTS: 1
DIFFICULTY: Moderate
REFERENCES: CREATING DISTRIBUTIONS FROM DATA, Pages 29-33
NATIONAL STANDARDS: United States - BUSPROG: Analytic skills - and DISC: Descriptive Statistics
KEYWORDS: Bloom's: Application

47. A survey on the most preferred newspaper in the USA listed The New York Times(TNYT), Washington Post(WP), Daily News(DN), New York Post(NYP), and Los Angeles Times (LAT) as the top five most preferred newspapers. The table below shows the preferences of 50 citizens.

TNYT	WP	NYP	WP	TNYT
DN	TNYT	LAT	WP	WP
DN	LAT	TNYT	TNYT	NYP
NYP	TNYT	WP	LAT	NYP
LAT	WP	DN	WP	LAT
WP	DN	TNYT	DN	DN
TNYT	TNYT	LAT	TNYT	NYP
LAT	LAT	NYP	WP	DN
WP	WP	TNYT	DN	TNYT
TNYT	DN	NYP	TNYT	WP

a. Are these data categorical or quantitative?
b. Provide frequency and percent frequency distributions.
c. On the basis of the sample, which newspaper is preferred the most?
ANSWER:

a. The given data are categorical.
b.

Newspapers	**Frequency**	**% Frequency**
TNYT	14	28
WP	12	24
DN	9	18
NYP	7	14
LAT	8	16
Total	50	100

c. The most preferred newspaper is The New York Times.

POINTS: 1
DIFFICULTY: Moderate
REFERENCES: CREATING DISTRIBUTIONS FROM DATA, Pages 29-33
NATIONAL STANDARDS: United States - BUSPROG: Analytic skills - and DISC: Descriptive Statistics
KEYWORDS: Bloom's: Application

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48. The mentor of a class researched the number of hours spent on study in a week by each student of the class in order to analyze the correlation between the study hours and the marks obtained by each student. The data on the hours spent per week by 25 students are listed below.

13	14	16	15	12
12	19	21	22	19
13	16	18	25	21
17	18	23	16	12
24	20	14	22	15

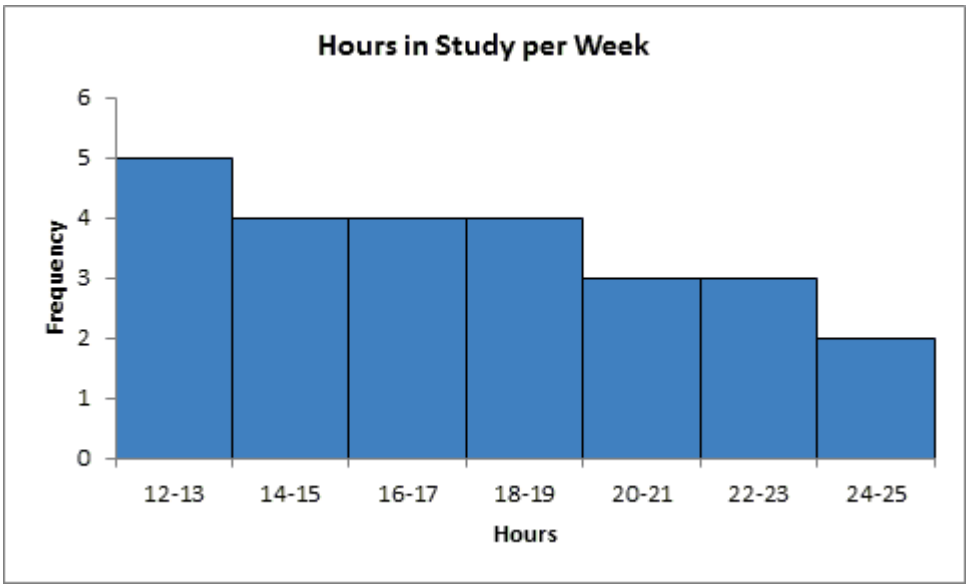
a. What is the least amount of time a student spent per week on studying in this sample? The highest?
b. Use a class width of 2 hours to prepare a frequency distribution, a relative frequency distribution, and a percent frequency distribution for the data.
c. Prepare a histogram and comment on the shape of the distribution.

ANSWER:

a. The least time a student spent was 12 hours, and the highest was 25 hours.
b.

Hours in Study per Week	Frequency	Relative Frequency	% Frequency
12–13	5	0.2	20
14–15	4	0.16	16
16–17	4	0.16	16
18–19	4	0.16	16
20–21	3	0.12	12
22–23	3	0.12	12
24–25	2	0.08	8
Total	25	1	100

c.



The distribution is skewed to the right.

POINTS: 1
DIFFICULTY: Moderate
REFERENCES: CREATING DISTRIBUTIONS FROM DATA, Pages 29-38
NATIONAL STANDARDS: United States - BUSPROG: Analytic skills - and DISC: Descriptive Statistics
KEYWORDS: Bloom's: Application

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49. The manager of an automobile showroom studied the time spent by each salesperson interacting with the customer in a month apart from the other jobs assigned to them. The data in hours are given below.

17	13
18	16
20	24
15	19
19	12
10	16
26	27
13	23
17	15
24	20
14	21
26	24

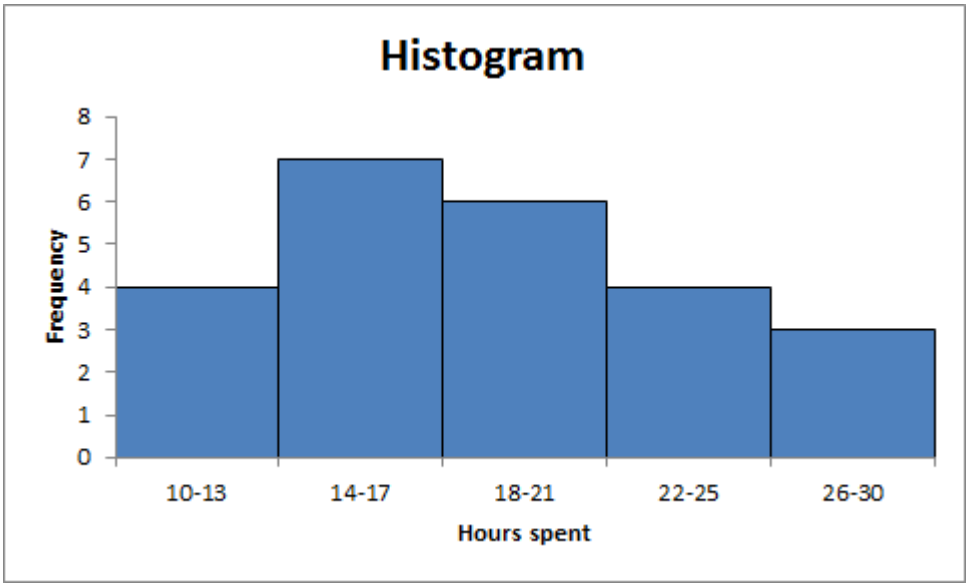
Using classes 10-13, 14-17, and so on, show:
a. The frequency distribution.
b. The relative frequency distribution.
c. The cumulative frequency distribution.
d. The cumulative relative frequency distribution.
e. The proportion of salesperson who spent 13 hours of time or less with the customers.
f. Prepare a histogram and comment on the shape of the distribution.

ANSWER: a. – d.

Class	Frequency	Relative Frequency	Cumulative Frequency	Cumulative Relative Frequency
10–13	4	0.17	4	0.17
14–17	7	0.29	11	0.46
18–21	6	0.25	17	0.71
22–25	4	0.17	21	0.88
26–29	3	0.13	24	1.00 (approx.)
Total	24	˜1		

e. From the cumulative relative frequency distribution, 17% of the salespersons spent 13 hours of time or less with the customers.

f.



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The distribution is skewed to the right.

POINTS: 1
DIFFICULTY: Challenging
REFERENCES: CREATING DISTRIBUTIONS FROM DATA, Pages 29-38
NATIONAL STANDARDS: United States - BUSPROG: Analytic skills - and DISC: Descriptive Statistics
KEYWORDS: Bloom's: Application

50. The scores of a sample of students in a Math test are 20, 15, 19, 21, 22, 12, 17, 14, 24, 16 and in a Stat test are 16, 12, 19, 17, 22, 14, 20, 21, 24, 15, 13.
a. Compute the mean and median scores for both the Math and the Stat tests.
b. Compare the mean and median scores computed in part a. Comment.
ANSWER:

a. For Math test:
Mean = 18
Median = 18

For Stat test:
Mean = 17.5
Median = 17
b. The mean and the median scores for statistics are lower than that for mathematics. These lower values are because of an additional score 13 for statistics, which is lower than the mean and the median scores for mathematics.

POINTS: 1
DIFFICULTY: Moderate
REFERENCES: MEASURES OF LOCATION, Page 39-40
NATIONAL STANDARDS: United States - BUSPROG: Analytic skills - and DISC: Descriptive Statistics
KEYWORDS: Bloom's: Application

51. Consider a sample on the waiting times (in minutes) at the billing counter in a grocery store to be 15, 24, 18, 15, 21, 20, 15, 22, 19, 16, 15, 22, 20, 15, and 21. Compute the mean, median, and mode.
ANSWER:

Mean = 18.53
Median = 19
Mode = 15

POINTS: 1
DIFFICULTY: Moderate
REFERENCES: MEASURES OF LOCATION, Pages 39-41
NATIONAL STANDARDS: United States - BUSPROG: Analytic skills - and DISC: Descriptive Statistics
KEYWORDS: Bloom's: Application

52. Suppose that you make a fixed deposit of $1,000 in Bank X and $500 in Bank Y. The value of each investment at the end of each subsequent year is provided in the table.

Year	Bank X ($)	Bank Y ($)
1	1,320	560
2	1,510	620
3	1,750	680
4	2,090	740
5	2,240	790
6	2,470	820

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7	2,830	870
8	3,220	910
9	3,450	950
10	3,690	990

Which of the two banks provides a better return over this time period?

ANSWER:

a.

Year	Bank X	Growth Factor	Bank Y	Growth Factor
	1,000		500	
1	1,320	1.32	560	1.12
2	1,510	1.14	620	1.11
3	1,750	1.16	680	1.10
4	2,090	1.19	740	1.09
5	2,240	1.07	790	1.07
6	2,470	1.10	820	1.04
7	2,830	1.15	870	1.06
8	3,220	1.14	910	1.05
9	3,450	1.07	950	1.04
10	3,690	1.07	990	1.04
	Geometric Mean	1.1395	**Geometric Mean**	1.0707
	% of return	13.95%	**% of return**	7.07%

Bank X provides a better return when compared to Bank Y.

POINTS: 1

DIFFICULTY: Challenging

REFERENCES: MEASURES OF LOCATION, Pages 41-43

NATIONAL STANDARDS: United States - BUSPROG: Analytic skills - and DISC: Descriptive Statistics

KEYWORDS: Bloom's: Application

53. Consider a sample on the waiting times (in minutes) at the billing counter in a grocery store to be 15, 24, 18, 15, 21, 20, 15, 22, 19, 16, 15, 22, 20, 15, and 21. Compute the 25^{th}, 50^{th}, and 75^{th} percentiles.

ANSWER:

25^{th} percentile = 15

50^{th} percentile = 19

75^{th} percentile = 21

POINTS: 1

DIFFICULTY: Moderate

REFERENCES: ANALYZING DISTRIBUTIONS, Pages 49-50

NATIONAL STANDARDS: United States - BUSPROG: Analytic skills - and DISC: Descriptive Statistics

KEYWORDS: Bloom's: Application

54. Suppose that the average time an employee takes to reach the office is 35 minutes. To address the issue of late comers, the mode of transport chosen by the employee is tracked: private transport (two-wheelers and four-wheelers) and public transport. The data on the average time (in minutes) taken using both a private transportation system and a public transportation system for a sample of employees are given below.

Private Transport	Public Transport
27	30

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33	29
28	25
32	20
20	27
34	32
30	37
28	38
18	21
29	35

a. What are the mean and median travel times for employees using a private transport? What are the mean and median travel times for employees using a public transport?
b. What are the variance and standard deviation of travel times for employees using a private transport? What are the variance and standard deviation of travel times for employees using a public transport?
c. Comment on the results.

ANSWER: Travel times (in minutes)
a. Using private transport:
Mean = 27.9
Median = 28.5

Using public transport:
Mean = 29.4
Median = 29.5

b. Using private transport:
Variance= 27.43
Standard deviation = 5.24

Using public transport:
Variance = 39.38
Standard deviation = 6.28

c. The travel times of employees using a private transport are less than those using a public transport.

POINTS: 1
DIFFICULTY: Moderate
REFERENCES: MEASURES OF LOCATION, Pages 39-40 and MEASURES OF VARIABILITY, Page 46-47
NATIONAL STANDARDS: United States - BUSPROG: Analytic skills - and DISC: Descriptive Statistics
KEYWORDS: Bloom's: Application

55. The average time a customer service executive takes to resolve an issue on a mobile handset is 26.4 minutes. The average times taken to resolve the issue by a sample of 15 such executives are shown below.

Name	**Time (in minutes)**
Jack	25.3
Samantha	28.2
Richard	26.8
Steve	29.5
Mary	22.4
Sergio	21.7
John	24.3
Michelle	22.4

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Linda	26.8
Mark	29.4
Matt	23.6
Polly	26.4
Sheila	23.5
Jeff	26.8
Gerald	28.1

a. What is the mean resolution time?
b. What is the median resolution time?
c. What is the mode for these 15 executives?
d. What is the variance and standard deviation?
e. What is the third quartile?

ANSWER:

a. Mean = 25.68
b. Median = 26.4
c. Mode = 26.8
d. Variance = 6.67; Standard deviation = 2.58
e. Third quartile = 28.1

POINTS: 1
DIFFICULTY: Moderate
REFERENCES: ANALYZING DISTRIBUTIONS, Pages 39-40 and 46-47
NATIONAL STANDARDS: United States - BUSPROG: Analytic skills - and DISC: Descriptive Statistics
KEYWORDS: Bloom's: Application

56. Suppose that the average time an employee takes to reach the office is 35 minutes. To address the issue of late comers, the mode of transport chosen by the employee is tracked: private transport (two-wheelers and four-wheelers) and public transport. The data on the average time (in minutes) taken using both a private transportation system and a public transportation system for a sample of employees are given below.

Private Transport	Public Transport
27	30
33	29
28	25
32	20
20	27
34	32
30	37
28	38
18	21
29	35

a. Considering the travel times (in minutes) of employees using private transport, compute the *z*-score for the tenth employee with travel time of 29 minutes.
b. Considering the travel times (in minutes) of employees using public transport, compute the *z*-score for the second employee with travel time of 29 minutes. How does this *z*-score compare with the *z*-score you calculated for part a?
c. Based on *z*-scores, do the data for employees using private transport and public transport contain any outliers?

ANSWER:

a. For tenth employee using private transport: First, calculate the mean (Average function in Excel) and standard deviation (StDev.S function in Excel) for private transport.

Mean = 27.9, StDev = 5.24

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The *z*-score is then obtained as, $z = \frac{(29-27.9)}{5.24} = 0.21.$

b. For second employee using public transport: First, calculate the mean (Average function in Excel) and standard deviation (StDev.S function in Excel) for public transport.
Mean = 29.4, StDev = 6.28

The *z*-score is then obtained as, $z = \frac{(29-29.4)}{6.28} = -0.06.$

Even though the employees had the same travel time, the z-score for the tenth employee in the sample who used a private transport is much larger because that employee is part of a sample with a smaller mean and a smaller standard deviation.

c.

Travel Times using Private Transport	z-score	Travel Times using Public Transport	z-score
27	–0.17	30	0.10
33	0.97	29	-0.06
28	0.02	25	–0.70
32	0.78	20	–1.50
20	–1.51	27	–0.38
34	1.16	32	0.41
30	0.40	37	1.21
28	0.02	38	1.37
18	–1.89	21	–1.34
29	0.21	35	0.89

No *z*-score is less than –3.0 or above +3.0; therefore, the *z*-scores do not indicate the existence of any outliers in either sample.

POINTS: 1
DIFFICULTY: Challenging
REFERENCES: ANALYZING DISTRIBUTIONS, Page 53
NATIONAL STANDARDS: United States - BUSPROG: Analytic skills - and DISC: Descriptive Statistics
KEYWORDS: Bloom's: Application

57. The results of a survey showed that, on average, children spend 5.6 hours at PlayStation per week. Suppose that the standard deviation is 1.7 hours and that the number of hours at PlayStation follows a bell-shaped distribution.
a. Use the empirical rule to calculate the percentage of children who spend between 2.2 and 9 hours at PlayStation per week.
b. What is the *z*-value for a child who spends 7.5 hours at PlayStation per week?
c. What is the *z*-value for a child who spends 4.5 hours at PlayStation per week?
ANSWER:

a. According to the empirical rule, approximately 95% of data values will be within two standard deviations of the mean.
2.2 is two standard deviations less than the mean, and 9 is two standard deviations greater than the mean. Therefore, approximately 95% of children spend between 2.2 and 9 hours at PlayStation per week.
b. $z = \frac{(7.5-5.6)}{1.7} = 1.12.$
c. $z = \frac{(4.5-5.6)}{1.7} = -0.65.$

POINTS: 1
DIFFICULTY: Moderate

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REFERENCES: ANALYZING DISTRIBUTIONS, Page 50
NATIONAL STANDARDS: United States - BUSPROG: Analytic skills - and DISC: Descriptive Statistics
KEYWORDS: Bloom's: Application

58. A study on the average minutes spent by students on internet usage is 300 with a standard deviation of 102. Answer the following questions assuming a bell-shaped distribution and using the empirical rule.
a. What percentage of students use internet for more than 402 minutes?
b. What percentage of students use internet for more than 504 minutes?
c. What percentage of students use internet between 198 minutes and 300 minutes?
ANSWER:

a. 402 is one standard deviation above the mean. The empirical rule states that 68% of data values will be within one standard deviation of the mean. Because a bell-shaped distribution is symmetric, 0.5 × (1– 68%) = 16% of the data values will be greater than (mean + 1 × standard deviation) 402. 16% of students use internet for more than 402 minutes.

b. 504 is two standard deviations above the mean. The empirical rule states that 95% of data values will be within two standard deviations of the mean. Because a bell-shaped distribution is symmetric, 0.5 × (1– 95%) = 2.5% of the data values will be greater than (mean + 2 × standard deviation) 504. 2.5% of students use internet for more than 504 minutes.

c. 198 is one standard deviation below the mean. The empirical rule states that 68% of data values will be within one standard deviation of the mean, and we expect that 0.5 × (1 – 68%) = 16% of data values will be below one standard deviation below the mean. 300 is the mean, so we expect that 50% of the data values will be below the mean. Therefore, we expect 50% – 16% = 34% of the data values will be between the mean 300 and one standard deviation below the mean 198. 34% of students use internet between 198 minutes and 300 minutes.

POINTS: 1
DIFFICULTY: Challenging
REFERENCES: ANALYZING DISTRIBUTIONS, Page 51
NATIONAL STANDARDS: United States - BUSPROG: Analytic skills - and DISC: Descriptive Statistics
KEYWORDS: Bloom's: Application

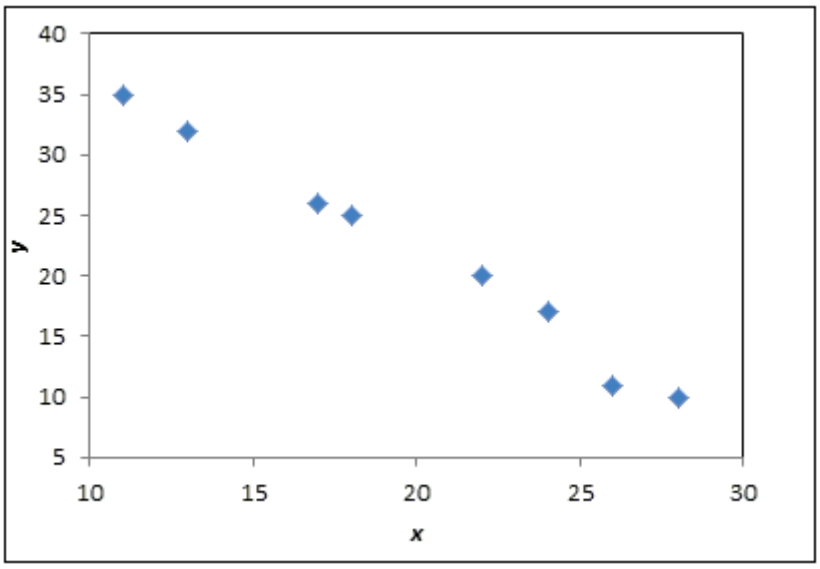
59. Eight observations taken for two variables are as follows:

x_i	y_i
11	35
13	32
17	26
18	25
22	20
24	17
26	11
28	10

a. Develop a scatter diagram with *x* on the horizontal axis.
b. What does the scatter diagram developed in part (a) indicate about the relationship between the two variables?
c. Compute and interpret the sample covariance.
d. Compute and interpret the sample correlation coefficient.
ANSWER: a.

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b. There appears to be a negative linear relationship between the *x* and *y* variables.

c.

x_i	y_i	$x_i - y_i$	$u - x_i$	$(x_i - \bar{x})(y_i - \bar{y})$
11	35	–8.88	13	–115.38
13	32	–6.88	10	–68.75
17	26	–2.88	4	–11.50
18	25	–1.88	3	–5.63
22	20	2.13	-2	–4.25
24	17	4.13	-5	–20.63
26	11	6.13	-11	–67.38
28	10	8.13	-12	–97.50
				–391

$\bar{x}$ = 19.88

$\bar{y}$ = 22

$s_{xy} = \frac{\sum(x_i - \bar{x})(y_i - \bar{y})}{n-1} = \frac{-391}{7} = -55.86$.

The negative covariance confirms that there is a negative linear relationship between the *x* and *y* variables in this data set.

d. $s_x = 6.13, s_y = 9.17$

Then the correlation coefficient is calculated as:

$r_{xy} = \frac{s_{xy}}{s_x s_y} = \frac{-55.86}{(6.13)(9.17)} = -0.99$.

The correlation coefficient again confirms and indicates a strong negative linear association between the *x* and *y* variables in this data set.

POINTS: 1
DIFFICULTY: Challenging
REFERENCES: MEASURES OF ASSOCIATION BETWEEN TWO VARIABLES, Pages 56-60
NATIONAL STANDARDS: United States - BUSPROG: Analytic skills - and DISC: Descriptive Statistics
KEYWORDS: Bloom's: Application

60. Consider the following data on income and savings of a sample of residents in a locality:

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Income ($ thousands)	Savings ($ thousands)
50	10
51	11
52	13
55	14
56	15
58	15
60	16
62	16
65	17
66	17

a. Compute the correlation coefficient. Is there a positive correlation between the income and savings? What is your interpretation?
b. Show a scatter diagram of the relationship between the income and savings.
ANSWER:

a.

x_i	y_i	$(x_i - \bar{x})$	$(y_i - \bar{y})$	$(x_i - \bar{x})^2$	$(y_i - \bar{y})^2$	$(x_i - \bar{x})(y_i - \bar{y})$
50	10	–7.5	–4.4	56.25	19.36	33
51	11	–6.5	–3.4	42.25	11.56	22.1
52	13	–5.5	–1.4	30.25	1.96	7.7
55	14	–2.5	–0.4	6.25	0.16	1
56	15	–1.5	0.6	2.25	0.36	–0.9
58	15	0.5	0.6	0.25	0.36	0.3
60	16	2.5	1.6	6.25	2.56	4
62	16	4.5	1.6	20.25	2.56	7.2
65	17	7.5	2.6	56.25	6.76	19.5
66	17	8.5	2.6	72.25	6.76	22.1
				292.5	52.4	116

$$s_{xy} = \frac{\sum(x_i - \bar{x})(y_i - \bar{y})}{n-1} = \frac{116}{9} = 12.89.$$

$$s_x = \sqrt{\frac{\sum(x_i - \bar{x})^2}{n-1}} = \sqrt{\frac{292.5}{9}} = 5.70.$$

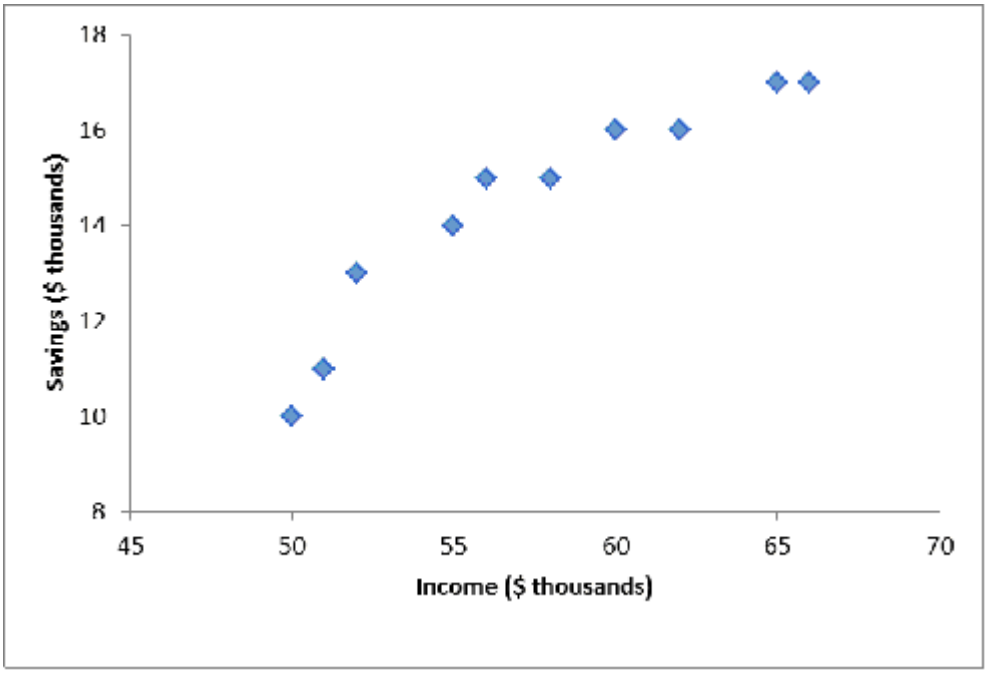
$$s_y = \sqrt{\frac{\sum(y - \bar{y})^2}{n-1}} = \sqrt{\frac{52.4}{9}} = 2.41.$$

$$r_{xy} = \frac{s_{xy}}{s_x s_y} = \frac{12.89}{(5.70)(2.41)} = 0.938$$

This indicates that there is a strong positive relationship between income and savings.
b.

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POINTS: 1
DIFFICULTY: Challenging
REFERENCES: MEASURES OF ASSOCIATION BETWEEN TWO VARIABLES, Pages 56-60
NATIONAL STANDARDS: United States - BUSPROG: Analytic skills - and DISC: Descriptive Statistics
KEYWORDS: Bloom's: Application

61. The College Board originally scaled SAT scores so that the scores for each section were approximately normally distributed with a mean of 500 and a standard deviation of 100. Assuming scores follow a bell-shaped distribution, use the empirical rule to find the percentage of students who scored greater than 700.

a. 97.5%
b. 95%
c. 2.5%
d. 5%

ANSWER: c
RATIONALE: *z*-score = (700 – 500)/100 = 2. Recall that 95% of the observations fall within two standard deviations of the mean, so 2.5% of the observations will fall above 2 standard deviations and 2.5% of observations will fall below –2 standard deviations. 2.5% of students will score greater than 700.
POINTS: 1
DIFFICULTY: Moderate
REFERENCES: ANALYZING DISTRIBUTIONS, Page 51
NATIONAL STANDARDS: United States - BUSPROG: Analytic skills - and DISC: Descriptive Statistics
KEYWORDS: Blooms: Application

62. The College Board originally scaled SAT scores so that the scores for each section were approximately normally distributed with a mean of 500 and a standard deviation of 100. Assuming scores follow a bell-shaped distribution, use the empirical rule to find the percentage of students who scored less than 400.

a. 16%
b. 68%

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c. 84%

d. 32%

ANSWER: a

RATIONALE: *z*-score = (400 – 500)/100 = –1. Recall that 68% of observations fall within one standard deviation of the mean, so 16% of observations will fall in each tail. The percentage of students who scored less than 400 (below –1 standard deviations) is 16%.

POINTS: 1

DIFFICULTY: Moderate

REFERENCES: ANALYZING DISTRIBUTIONS, Page 51

NATIONAL STANDARDS: United States - BUSPROG: Analytic skills - and DISC: Descriptive Statistics

KEYWORDS: Blooms: Application

63. The College Board reported that, in 2014, the mean Math Level 2 SAT subject test score was 686 with a standard deviation of 96. Assuming scores follow a bell-shaped distribution, use the empirical rule to find the percentage of students who scored less than 494.

a. 97.5%

b. 95%

c. 2.5%

d. 5%

ANSWER: c

RATIONALE: *z*-score = (494 – 686)/96 = –2. Recall that 95% of observations fall within two standard deviations of mean, which means 2.5% of observations fall in each tail. Since we want to know the percentage of students who scored less than 494, we essentially want to know the percentage of observations that fall below –2 standard deviations. 2.5% of observations fall below –2 standard deviations.

POINTS: 1

DIFFICULTY: Moderate

REFERENCES: ANALYZING DISTRIBUTIONS, Page 51

NATIONAL STANDARDS: United States - BUSPROG: Analytic skills - and DISC: Descriptive Statistics

KEYWORDS: Blooms: Application

64. Compute the relative frequencies for students who earned an A shown in the table of grades below.

Grades	Number of Students
A	10
B	31
C	36
D	6
	83

a. 0.12

b. 0.10

c. 0.83

d. Not enough information

ANSWER: a

RATIONALE: The relative frequency of a bin equals the fraction or proportion of items belonging to a class. Relative frequency of a bin = frequency of the bin /n.

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POINTS: 1
DIFFICULTY: Moderate
REFERENCES: CREATING DISTRIBUTIONS FROM DATA, Page 31
NATIONAL STANDARDS: United States - BUSPROG: Analytic skills - and DISC: Descriptive Statistics
KEYWORDS: Blooms: Application

65. Compute the relative frequencies for students who earned a C shown in the table of grades below.

Grades	Number of Students
A	10
B	31
C	36
D	6
	83

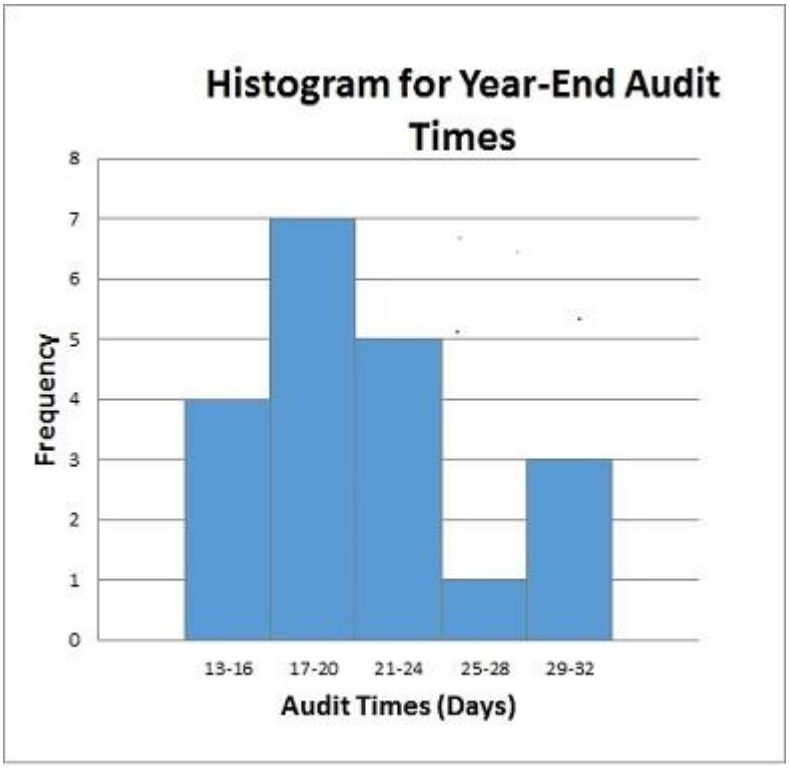
a. 0.43
b. 0.53
c. 0.83
d. Not enough information

ANSWER: a
RATIONALE: The relative frequency of a bin equals the fraction or proportion of items belonging to a class. Relative frequency of a bin = frequency of the bin /n.
POINTS: 1
DIFFICULTY: Moderate
REFERENCES: CREATING DISTRIBUTIONS FROM DATA, Page 31
NATIONAL STANDARDS: United States - BUSPROG: Analytic skills - and DISC: Descriptive Statistics
KEYWORDS: Blooms: Application

66. Below is a histogram for the number of days that it took Wyche Accounting to perform audits in the last quarter of last year. What is the relative frequency of the 21-24 bin?

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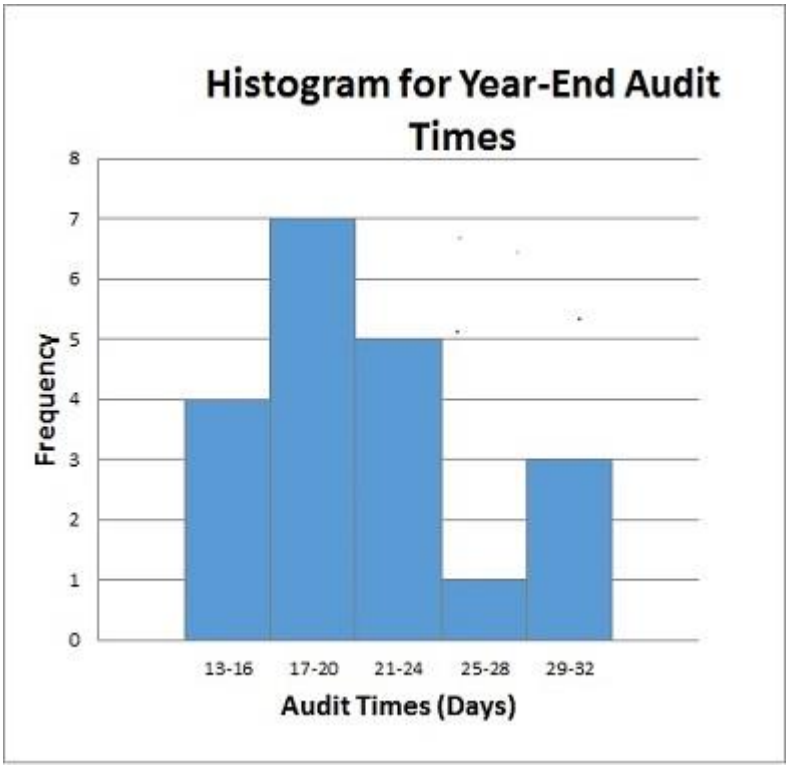
a. 0.05
b. 0.14
c. 0.25
d. 2.5

ANSWER: c
RATIONALE: The relative frequency of a bin equals the fraction or proportion of items belonging to a class. Relative frequency of a bin = frequency of the bin /n.
POINTS: 1
DIFFICULTY: Moderate
REFERENCES: CREATING DISTRIBUTIONS FROM DATA, Page 31
NATIONAL STANDARDS: United States - BUSPROG: Analytic skills - and DISC: Descriptive Statistics
KEYWORDS: Blooms: Application

67. Below is a histogram for the number of days that it took Wyche Accounting to perform audits in the last quarter of last year. What is the frequency of the 25-28 bin?

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a. 0.05
b. 1
c. 0.5
d. 4

ANSWER: b
RATIONALE: A frequency distribution is a summary of data that shows the number (frequency) of observations in each of several non-overlapping classes, typically referred to as bins.
POINTS: 1
DIFFICULTY: Moderate
REFERENCES: CREATING DISTRIBUTIONS FROM DATA, Page 29
NATIONAL STANDARDS: United States - BUSPROG: Analytic skills - and DISC: Descriptive Statistics
KEYWORDS: Blooms: Application

68. What is the relative frequency for Devon Pride?

2015 Contest Sales

Salesman	Frequency	Relative Frequency
Frances Clonts	15	0.05
Sarah Leigh	184	0.62
Devon Pride	37	
John Townes	62	0.21
Total	**298**	

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a. 0.12
b. 99.12
c. 0.88
d. Not enough information

ANSWER: a
RATIONALE: The relative frequencies should add up to 1.00. 1 – (0.05 + 0.62 + 0.21) = 0.12
POINTS: 1
DIFFICULTY: Moderate
REFERENCES: CREATING DISTRIBUTIONS FROM DATA, Page 31
NATIONAL STANDARDS: United States - BUSPROG: Analytic skills - and DISC: Descriptive Statistics
KEYWORDS: Blooms: Application

69. What is the total relative frequency?

2015 Contest Sales

Salesman	Frequency	Relative Frequency
Frances Clonts	15	0.05
Sarah Leigh	184	0.62
Devon Pride	37	
John Townes	62	0.21
Total	**298**	

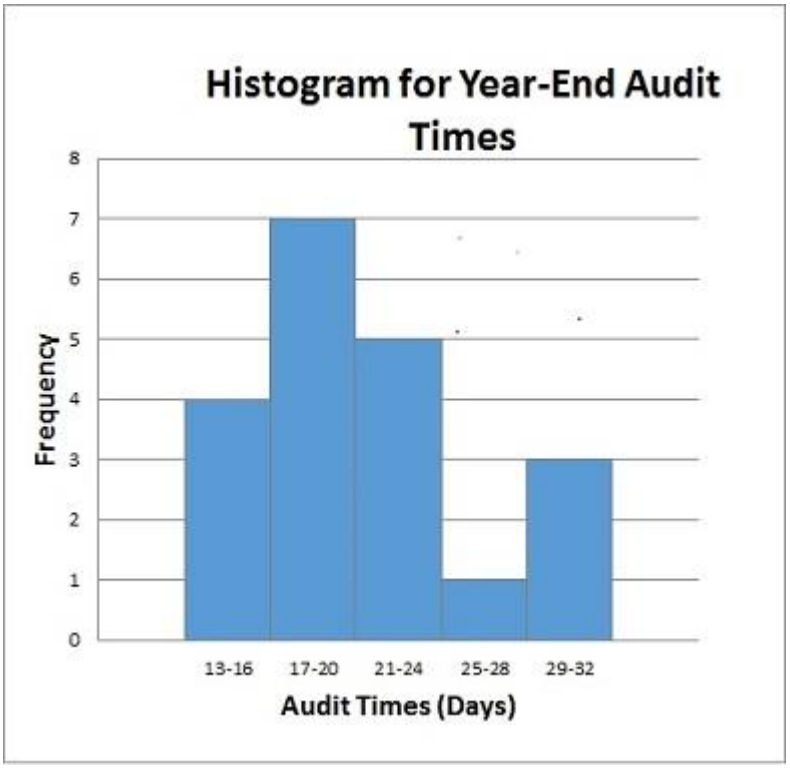
a. 1
b. 99.12
c. 0.88
d. Not enough information

ANSWER: a
RATIONALE: The relative frequencies should add up to 1.00.
POINTS: 1
DIFFICULTY: Moderate
REFERENCES: CREATING DISTRIBUTIONS FROM DATA, Page 38
NATIONAL STANDARDS: United States - BUSPROG: Analytic skills - and DISC: Descriptive Statistics
KEYWORDS: Blooms: Application

70. Below is a histogram for the number of days that it took Wyche Accounting to perform audits in the last quarter of last year. What is the bin size for the histogram?

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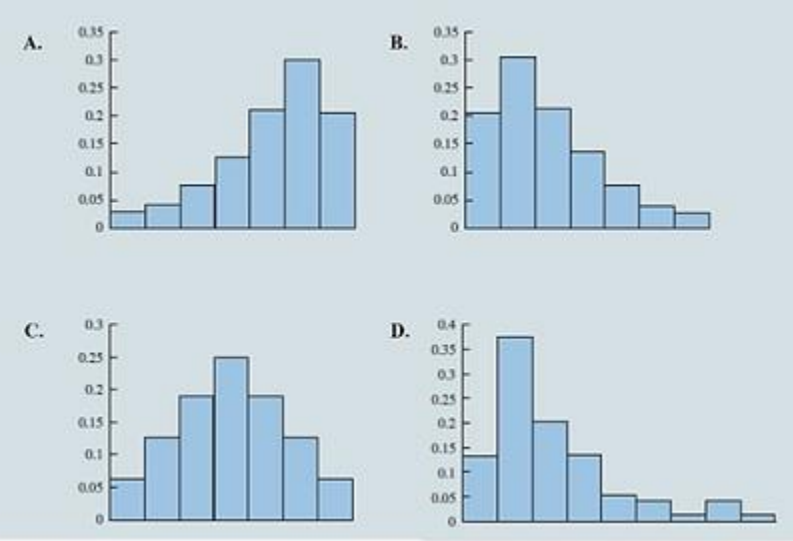
a. 3
b. 4
c. 16
d. 5

ANSWER: b
RATIONALE: (largest data value – smallest data value)/number of bins (32 – 13)/5 = 3.8, so we round up to 4
POINTS: 1
DIFFICULTY: Moderate
REFERENCES: CREATING DISTRIBUTIONS FROM DATA, Page 32
NATIONAL STANDARDS: United States - BUSPROG: Analytic skills - and DISC: Descriptive Statistics
KEYWORDS: Blooms: Application

71. Select the histogram that is moderately skewed right.

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a. A
b. B
c. C
d. D

ANSWER: b

RATIONALE: A histogram is said to be skewed to the right if its tail extends farther to the right than to the left. The given histogram is, therefore, moderately skewed to the right.

POINTS: 1

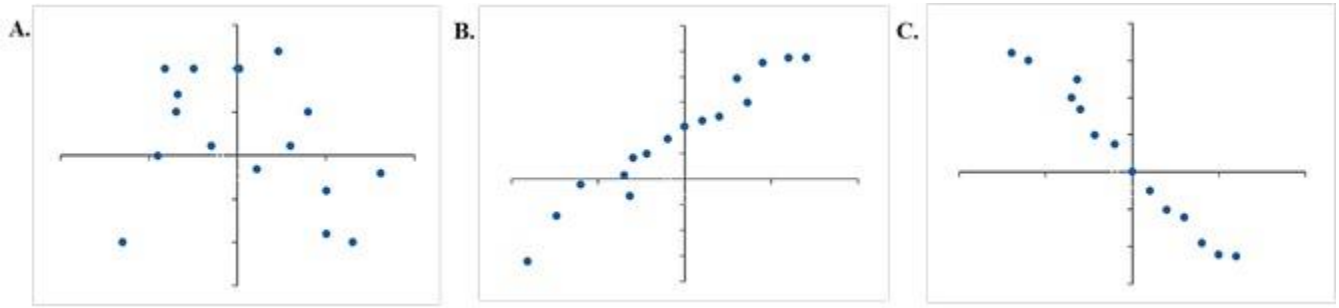
DIFFICULTY: Moderate

REFERENCES: CREATING DISTRIBUTIONS FROM DATA, Page 37

NATIONAL STANDARDS: United States - BUSPROG: Analytic skills - and DISC: Descriptive Statistics

KEYWORDS: Blooms: Knowledge

72. Which graph represents a negative linear relationship between *x* and *y*?



a. A
b. B
c. C
d. None of the graphs display a negative linear relationship.

ANSWER: c

RATIONALE: A negative relationship means that if one variable gets bigger, the other variable tends to get

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smaller.

POINTS: 1
DIFFICULTY: Moderate
REFERENCES: MEASURES OF ASSOCIATION BETWEEN TWO VARIABLES, Page 59
NATIONAL STANDARDS: United States - BUSPROG: Analytic skills - and DISC: Descriptive Statistics
KEYWORDS: Blooms: Application

73. Below is the data for the number of days that it took Wyche Accounting to perform audits in the last quarter of last year.

56, 42, 37, 29, 45, 51, 30, 25, 34, 57

What is the median number of days that it took Wyche Accounting to perform audits in the last quarter of last year?

a. 41
b. 40.6
c. 39.5
d. 42

ANSWER: c
RATIONALE: The median is the value in the middle when the data are arranged in ascending order (smallest to largest value). Computed as: median = average of middle two values = (37 + 42)/2 = 39.5
POINTS: 1
DIFFICULTY: Moderate
REFERENCES: MEASURES OF LOCATION, Page 40
NATIONAL STANDARDS: United States - BUSPROG: Analytic skills - and DISC: Descriptive Statistics
KEYWORDS: Blooms: Application

74. What is the mode of the data set given below?

35, 47, 65, 47, 22

a. 47.5
b. 47
c. 65
d. 22

ANSWER: b
RATIONALE: Mode is a measure of location, defined as the value that occurs with greatest frequency.
POINTS: 1
DIFFICULTY: Easy
REFERENCES: MEASURES OF LOCATION, Page 41
NATIONAL STANDARDS: United States - BUSPROG: Analytic skills - and DISC: Descriptive Statistics
KEYWORDS: Blooms: Application

75. A sample of 13 adult males' heights are listed below.

70, 72, 71, 70, 69, 73, 69, 68, 70, 71, 67, 71, 74

Find the range of the data.

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a. 7
b. 6.5
c. 5
d. 4

ANSWER: a
RATIONALE: The simplest measure of variability is the range. The range can be found by subtracting the smallest value from the largest value in a data set. 74 – 67 = 7
POINTS: 1
DIFFICULTY: Easy
REFERENCES: MEASURES OF VARIABILITY, Page 45
NATIONAL STANDARDS: United States - BUSPROG: Analytic skills - and DISC: Descriptive Statistics
KEYWORDS: Blooms: Knowledge

76. James's manager asked him to sort the last names in the following list in descending order. What does this mean?

Customer ID	First	Last	Sales	Quantity	Discount	Profit
CG-12520	Claire	Gute	$ 261.96	2	0	$ 41.91
DV-13045	Darrin	VanHuff	$ 14.62	2	0	$ 16.87
SO-20335	Sean	O'Donnell	$ 957.58	5	0.45	$ (383.03)
BH-11710	Brosina	Hoffman	$ 48.86	7	0	$ 14.17
AA-10480	Andrew	Allen	$ 25.55	3	0.2	$ 5.44
IM- 15070	Irene	Maddox	$ 407.98	3	0.2	$ 132.59
HP-14815	Harold	Pawlan	$ 68.81	5	0.8	$ (123.86)
PK-19075	Pete	Kriz	$ 665.88	6	0	$ 13.32
AG-10270	Alejandro	Grove	$ 55.50	2	0	$ 9.99
ZD-21925	Zuschuss	Donatelli	$ 8.56	2	0	$ 2.48

a. The last names must be sorted from A to Z.
b. The last names must be sorted from Z to A.
c. The last names must be sorted from the earliest to the latest that has been added to the list.
d. James should use the Sort function to organize the data into order of sales.

ANSWER: b
RATIONALE: To sort in descending order is to sort from Z to A.
POINTS: 1
DIFFICULTY: Moderate
REFERENCES: MODIFYING DATA IN EXCEL, Pages 23-24
NATIONAL STANDARDS: United States - BUSPROG: Analytic skills - and DISC: Descriptive Statistics
KEYWORDS: Blooms: Application

77. You have been asked to reorganize the Excel table below into order of sales using the Sales column. Which option will allow you to do this quickly?

Customer ID	First	Last	Sales	Quantity	Discount	Profit
CG-12520	Claire	Gute	$ 261.96	2	0	$ 41.91

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DV-13045	Darrin	VanHuff	$	14.62	2	0	$ 16.87
SO-20335	Sean	O'Donnell	$	957.58	5	0.45	$ (383.03)
BH-11710	Brosina	Hoffman	$	48.86	7	0	$ 14.17
AA-10480	Andrew	Allen	$	25.55	3	0.2	$ 5.44
IM- 15070	Irene	Maddox	$	407.98	3	0.2	$ 132.59
HP-14815	Harold	Pawlan	$	68.81	5	0.8	$ (123.86)
PK-19075	Pete	Kriz	$	665.88	6	0	$ 13.32
AG-10270	Alejandro	Grove	$	55.50	2	0	$ 9.99
ZD-21925	Zuschuss	Donatelli	$	8.56	2	0	$ 2.48

a. Use the Cut and Paste function to reorganize the data into order of sales.
b. Use the Filter function to organize the data into order of sales.
c. Use the Order function to organize the data into order of sales.
d. Use the Sort function to organize the data into order of sales.

ANSWER: d
RATIONALE: The sort and filter tools in Excel allow you to organize and manipulate data quickly and easily.
POINTS: 1
DIFFICULTY: Easy
REFERENCES: MODIFYING DATA IN EXCEL, Pages 23-24
NATIONAL STANDARDS: United States - BUSPROG: Analytic skills - and DISC: Descriptive Statistics
KEYWORDS: Blooms: Application

78. Which Excel command will return all modes when more than one mode exists?

a. MODE.MULT
b. MODE.SNGL
c. MODE
d. MODES

ANSWER: a
RATIONALE: Use the Excel command MODE.MULT to return more than one mode.
POINTS: 1
DIFFICULTY: Moderate
REFERENCES: MODIFYING DATA IN EXCEL, Page 41
NATIONAL STANDARDS: United States - BUSPROG: Analytic skills - and DISC: Descriptive Statistics
KEYWORDS: Blooms: Knowledge

79. In a survey of patients in a local hospital, 62.42% of the respondents indicated that the health care providers needed to spend more time with each patient. What is the population being studied?

a. All patients in a local hospital
b. All survey respondents
c. Hospital patients
d. Cannot be determined from the information given

ANSWER: a

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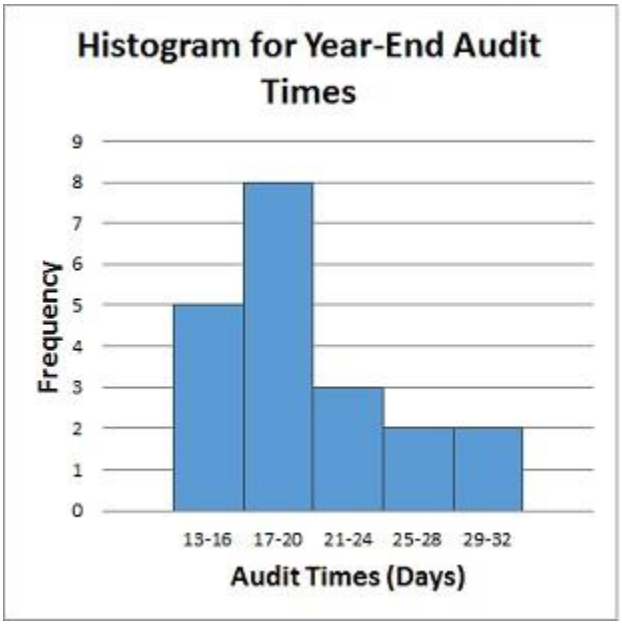
RATIONALE: A population is the set of all elements of interest in a particular study.
POINTS: 1
DIFFICULTY: Easy
REFERENCES: TYPES OF DATA, Page 20
NATIONAL STANDARDS: United States - BUSPROG: Analytic skills - and DISC: Descriptive Statistics
KEYWORDS: Blooms: Application

80. In a survey of patients in a local hospital, 62.42% of the respondents indicated that the health care providers needed to spend more time with each patient. What is the sample for the population being studied?

a. All patients in a local hospital
b. All survey respondents
c. Hospital patients
d. Cannot be determined from the information given

ANSWER: b
RATIONALE: A sample is a subset of the population.
POINTS: 1
DIFFICULTY: Easy
REFERENCES: MODIFYING DATA IN EXCEL, Page 20
NATIONAL STANDARDS: United States - BUSPROG: Analytic skills - and DISC: Descriptive Statistics
KEYWORDS: Blooms: Application

81. Below is a histogram for the number of days that it took Wyche Accounting to perform audits in the last quarter of last year. What is the relative frequency of the 21-24 bin?



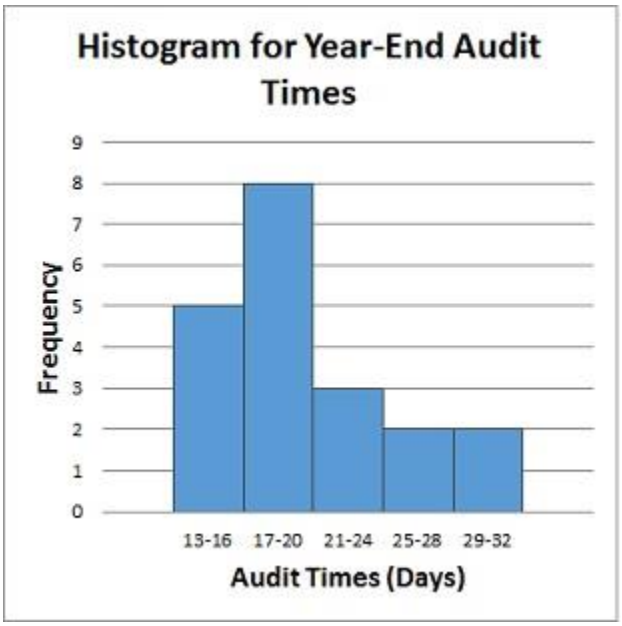
ANSWER: 0.15
RATIONALE: Relative frequency of a bin = Frequency of the bin/n. 3/20 = 0.15
POINTS: 1
DIFFICULTY: Moderate
REFERENCES: CREATING DISTRIBUTIONS FROM DATA, Page 31

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NATIONAL STANDARDS: United States - BUSPROG: Analytic skills - and DISC: Descriptive Statistics
KEYWORDS: Blooms: Application

82. Below is a histogram for the number of days that it took Wyche Accounting to perform audits in the last quarter of last year. What is the relative frequency of the 25-28 bin?



ANSWER: 0.10
RATIONALE: Relative frequency of a bin = Frequency of the bin/n. So the relative frequency of the 25-28 bin = 2/20 = 0.10
POINTS: 1
DIFFICULTY: Moderate
REFERENCES: CREATING DISTRIBUTIONS FROM DATA, Page 31
NATIONAL STANDARDS: United States - BUSPROG: Analytic skills - and DISC: Descriptive Statistics
KEYWORDS: Blooms: Application

83. Below are the data for the number of days that it took Wyche Accounting to perform audits in the last quarter of last year.

56, 42, 37, 29, 45, 51, 30, 25, 34, 57

What is(are) the mode(s) number of days that it took Wyche Accounting to perform audits in the last quarter of last year?
ANSWER: None
RATIONALE: Mode is a measure of location, defined as the value that occurs with greatest frequency. In this case, there are no values that occur more than once.
POINTS: 1
DIFFICULTY: Moderate
REFERENCES: MEASURES OF LOCATION, Page 41
NATIONAL STANDARDS: United States - BUSPROG: Analytic skills - and DISC: Descriptive Statistics
KEYWORDS: Blooms: Application

84. What is(are) the mode(s) of the following data set?

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35, 42, 65, 42, 22

ANSWER: 42
RATIONALE: Mode is a measure of location, defined as the value that occurs with greatest frequency.
POINTS: 1
DIFFICULTY: Moderate
REFERENCES: MEASURES OF LOCATION, Page 41
NATIONAL STANDARDS: United States - BUSPROG: Analytic skills - and DISC: Descriptive Statistics
KEYWORDS: Blooms: Application

85. The difference between the largest and the smallest data values is the _____.

ANSWER: range
RATIONALE: The simplest measure of variability is the range. The range can be found by subtracting the smallest value from the largest value in a data set.
POINTS: 1
DIFFICULTY: Easy
REFERENCES: MEASURES OF VARIABILITY, Page 45
NATIONAL STANDARDS: United States - BUSPROG: Analytic skills - and DISC: Descriptive Statistics
KEYWORDS: Blooms: Knowledge

86. The Excel function STANDARDIZE can be used to calculate _____.

ANSWER: z-scores
RATIONALE: The *z*-score can be calculated in Excel using the function STANDARDIZE.
POINTS: 1
DIFFICULTY: Moderate
REFERENCES: MEASURES OF VARIABILITY, Page 50
NATIONAL STANDARDS: United States - BUSPROG: Analytic skills - and DISC: Descriptive Statistics
KEYWORDS: Blooms: Knowledge

87. You would _____ a table if you wanted to display only data that match specific criteria.

ANSWER: filter
RATIONALE: The filter feature in Excel allows you to find, view, and work with a subset of data.
POINTS: 1
DIFFICULTY: Moderate
REFERENCES: MODIFYING DATA IN EXCEL, Pages 23-25
NATIONAL STANDARDS: United States - BUSPROG: Analytic skills - and DISC: Descriptive Statistics
KEYWORDS: Blooms: Knowledge

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