Chapter 02

Describing Data: Frequency Tables, Frequency Distributions, and Graphic Presentation

True / False Questions

1. A frequency distribution groups data into classes showing the number of observations in each class.

   True   False

2. A frequency distribution for qualitative data has class limits.

   True   False

3. To summarize the gender of students attending a college, the number of classes in a frequency distribution depends on the number of students.

   True   False

4. In frequency distributions, classes are mutually exclusive if each individual, object, or measurement is included in only one category.

   True   False

5. In a bar chart, the x-axis is labeled with the values of a qualitative variable.

   True   False

6. In a bar chart, the heights of the bars represent the frequencies in each class.

   True   False

7. The midpoint of a class, which is also called a class mark, is halfway between the lower and upper limits.

   True   False

8. A class interval, or class width, can be determined by subtracting the lower limit of a class from the lower limit of the next higher class.

   True   False

9. To convert a frequency distribution to a relative frequency distribution, divide each class frequency by the sum of the class frequencies.

   True   False

10. To convert a frequency distribution to a relative frequency distribution, divide each class frequency by the number of classes.

    True   False

11. A pie chart is similar to a relative frequency distribution.

    True   False

12. A pie chart shows the relative frequency in each class.

    True   False

13. To construct a pie chart, relative class frequencies are used to graph the "slices" of the pie.

    True   False

14. A cumulative frequency distribution is used when we want to determine how many observations lie above or below certain values.

    True   False

15. A frequency polygon is a very useful graphic technique when comparing two or more distributions.

    True   False

Multiple Choice Questions

16. Monthly commissions of first-year insurance brokers are $1,270, $1,310, $1,680, $1,380, $1,410, $1,570, $1,180 and $1,420. These figures are referred to as a(n) _____.

    A. Histogram
    B. Raw data
    C. Frequency distribution
    D. Frequency polygon

17. A small sample of computer operators shows monthly incomes of $1,950, $1,775, $2,060, $1,840, $1,795, $1,890, $1,925, and $1,810. What are these ungrouped numbers called?

    A. Histogram
    B. Class limits
    C. Class frequencies
    D. Raw data

18. When data is collected using a quantitative, ratio variable, what is true about a frequency distribution that summarizes the data?

    A. Upper and lower class limits must be calculated.

    B. A pie chart can be used to summarize the data.

    C. The number of classes is equal to the number of variable's values.

    D. The "5 to the k rule" can be applied.

19. When data is collected using a qualitative, nominal variable, what is true about a frequency distribution that summarizes the data?

    A. The upper and lower class limits must be calculated.

    B. A pie chart can be used to summarize the data.

    C. The number of classes is equal to the number of variable's values plus 2.

    D. The "5 to the k rule" can be applied.

20. When data is collected using a qualitative, nominal variable (in other words, male or female), what is true about a frequency distribution that summarizes the data?

    A. The upper and lower class limits must be calculated.

    B. Class midpoints can be computed.

    C. The number of classes corresponds to the number of a variable's values.

    D. The "2 to the k rule" can be applied.

21. A student was interested in the cigarette smoking habits of college students and collected data from an unbiased random sample of students. The data is summarized in the following table:

Males	50
Females	75
Males who smoke	20
Males who do not smoke	30
Females who smoke	25
Females who do not smoke	50

Why is the table NOT a frequency distribution?

A. The number of males does not equal the sum of males that smoke and do not smoke.

B. The classes are not mutually exclusive.

C. There are too many classes.

D. Class limits cannot be computed.

22. A student was interested in the cigarette smoking habits of college students and collected data from an unbiased random sample of students. The data is summarized in the following table:

Males who smoke	20
Males who do not smoke	30
Females who smoke	25
Females who do not smoke	50

What type of chart best represents the frequency table?

A. Bar chart

B. Box plot

C. Scatter plot

D. Frequency polygon

23. A student was interested in the cigarette smoking habits of college students and collected data from an unbiased random sample of students. The data is summarized in the following table:

Males who smoke	20
Males who do not smoke	30
Females who smoke	25
Females who do not smoke	50

What type of chart best represents relative class frequencies?

A. Box plot

B. Pie chart

C. Scatter plot

D. Frequency polygon

24. When a class interval is expressed as 100 up to 200, _____.

A. Observations with values of 100 are excluded from the class

B. Observations with values of 200 are included in the class

C. Observations with values of 200 are excluded from the class

D. The class interval is 99

25. For a relative frequency distribution, relative frequency is computed as _____.

A. The class width divided by the class interval

B. The class midpoint divided by the class frequency

C. The class frequency divided by the class interval

D. The class frequency divided by the total frequency

26. The relative frequency for a class represents the _____.

    A. Class width
    B. Class midpoint
    C. Class interval
    D. Percent of observations in the class

27. A group of 100 students was surveyed about their interest in a new International Studies program. Interest was measured in terms of high, medium, or low. In the study, 30 students responded high interest, 40 students responded medium interest, and 30 students responded low interest. What is the relative frequency of students with high interest?

    A. .30
    B. .50
    C. .40
    D. .030

28. A group of 100 students were surveyed about their interest in a new Economics major. Interest was measured in terms of high, medium, or low. In the study, 30 students responded high interest, 50 students responded medium interest, and 20 students responded low interest. What is the **best** way to illustrate the relative frequency of student interest?

    A. Use a cumulative frequency polygon
    B. Use a box plot
    C. Use a pie chart
    D. Use a frequency table

29. The monthly salaries of a sample of 100 employees were rounded to the nearest $10. They ranged from a low of $1,040 to a high of $1,720. If we want to condense the data into seven classes, what is the most convenient class interval?

   A. $50
   B. $100
   C. $150
   D. $200

30. A student was studying the political party preferences of a university's student population. The survey instrument asked students to identify themselves as a Democrat or a Republican. This question is flawed because:

   A. Students generally don't know their political preferences.
   B. The categories are generally mutually exclusive.
   C. The categories are not exhaustive.
   D. Political preference is a continuous variable.

31. A student was studying the political party preferences of a university's student population. The survey instrument asked students to identify their political preference, for example, Democrat, Republican, Libertarian, or another party. The best way to illustrate the frequencies for each political preference is a _____.

   A. Bar chart
   B. Box plot
   C. Histogram
   D. Frequency polygon

32. A student was studying the political party preferences of a university's student population. The survey instrument asked students to identify their political preference—for example, Democrat, Republican, Libertarian, or another party. The best way to illustrate the relative frequency distribution is a _____.

   A. Bar chart
   B. Pie chart
   C. Histogram
   D. Frequency polygon

33. What is the following table called?

Ages	Number of Ages
20 up to 30	16
30 up to 40	25
40 up to 50	51
50 up to 60	80
60 up to 70	20
70 up to 80	8

   A. Histogram
   B. Frequency polygon
   C. Cumulative frequency distribution
   D. Frequency distribution

34. For the following distribution of heights, what are the limits for the class with the greatest frequency?

Heights	60" up to 65"	65" up to 70"	70" up to 75"
Frequency	10	70	20

   A. 64 and up to 70

   B. 65 and 69

   C. 65 and up to 70

   D. 69.5 and 74.5

35. In a frequency distribution, the number of observations in a class is called the class _____.

   A. Midpoint

   B. Interval

   C. Array

   D. Frequency

36. Why are unequal class intervals sometimes used in a frequency distribution?

   A. To avoid a large number of empty classes

   B. For the sake of variety in presenting the data

   C. To make the class frequencies smaller

   D. To avoid the need for midpoints

37. The number of employees less than the upper limit of each class at Lloyd's Fast Food Emporium is shown in the following table:

Ages	Cumulative Number
18 up to 23	6
23 up to 38	19
28 up to 33	52
33 up to 38	61
38 up to 43	65

What is it called?

A. A histogram

B. A cumulative frequency table

C. A pie chart

D. A frequency polygon

38. A sample distribution of hourly earnings in Paul's Cookie Factory is:

Hourly Earnings	$6 up to $9	$9 up to $12	$12 up to $15
Frequency	16	42	10

The limits of the class with the smallest frequency are:

A. $6.00 and $9.00

B. $12.00 and up to $14.00

C. $11.75 and $14.25

D. $12.00 and up to $15.00

39. Refer to the following distribution of commissions:

Monthly Commissions	Class Frequencies
$600 up to $800	3
800 up to 1,000	7
1,000 up to 1,200	11
1,200 up to 1,400	22
1,400 up to 1,600	40
1,600 up to 1,800	24
1,800 up to 2,000	9
2,000 up to 2,200	4

What is the relative frequency for those salespersons that earn from $1,600 up to $1,800?

A. .02

B. .024

C. .20

D. .24

40. Refer to the following distribution of commissions:

Monthly Commissions	Class Frequencies
$600 up to $800	3
800 up to 1,000	7
1,000 up to 1,200	11
1,200 up to 1,400	22
1,400 up to 1,600	40
1,600 up to 1,800	24
1,800 up to 2,000	9
2,000 up to 2,200	4

To plot a cumulative frequency distribution, the first coordinate would be _____.

A. $X = 0$, $Y = 600$

B. $X = 500$, $Y = 3$

C. $X = 3$, $Y = 600$

D. $X = 600$, $Y = 0$

41. Refer to the following distribution of commissions:

Monthly Commissions	Class Frequencies
$600 up to $800	3
800 up to 1,000	7
1,000 up to 1,200	11
1,200 up to 1,400	22
1,400 up to 1,600	40
1,600 up to 1,800	24
1,800 up to 2,000	9
2,000 up to 2,200	4

What is the relative frequency of those salespersons that earn $1,600 or more?

A. 25.5%

B. 27.5%

C. 29.5%

D. 30.8%

42. Refer to the following distribution of commissions:

Monthly Commissions	Class Frequencies
$600 up to $800	3
800 up to 1,000	7
1,000 up to 1,200	11
1,200 up to 1,400	22
1,400 up to 1,600	40
1,600 up to 1,800	24
1,800 up to 2,000	9
2,000 up to 2,200	4

For the preceding distribution, what is the midpoint of the class with the greatest frequency?

A. 1,400

B. 1,500

C. 1,700

D. The midpoint cannot be determined.

43. Refer to the following distribution of commissions:

Monthly Commissions	Class Frequencies
$600 up to $800	3
800 up to 1,000	7
1,000 up to 1,200	11
1,200 up to 1,400	22
1,400 up to 1,600	40
1,600 up to 1,800	24
1,800 up to 2,000	9
2,000 up to 2,200	4

What is the class interval?

A. 200

B. 300

C. 3,500

D. 400

44. Refer to the following wage breakdown for a garment factory.

Hourly Wages	Number of Employees
$4 up to $7	18
7 up to 10	36
10 up to 13	20
13 up to 16	6

What is the class interval for the preceding table of wages?

A. $2

B. $3

C. $4

D. $5

45. Refer to the following wage breakdown for a garment factory.

Hourly Wages	Number of Employees
$4 up to $7	18
7 up to 10	36
10 up to 13	20
13 up to 16	6

What is the class midpoint for the class with the greatest frequency?

A. $5.50

B. $8.50

C. $11.50

D. $14.50

46. Refer to the following wage breakdown for a garment factory.

Hourly Wages	Number of Employees
$4 up to $7	18
7 up to 10	36
10 up to 13	20
13 up to 16	6

What are the class limits for the class with the smallest frequencies?

A. 3.5 and 6.5

B. 4 and up to 7

C. 13 and up to 16

D. 12.5 and 15.5

47. Refer to the following distribution of ages:

Ages	Frequency
40 up to 50	10
50 up to 60	28
60 up to 70	12

For the distribution of ages just shown, what is the relative class frequency for the lowest class?

A. .50

B. .18

C. .20

D. .10

48. Refer to the following distribution of ages:

Ages	Frequency
40 up to 50	10
50 up to 60	28
60 up to 70	12

What is the class interval?

A. 9

B. 10

C. 10.5

D. 11

49. Refer to the following distribution of ages:

Ages	Frequency
40 up to 50	10
50 up to 60	28
60 up to 70	12

What is the class midpoint of the highest class?

A. 54
B. 55
C. 64
D. 65

50. Refer to the following information from a frequency distribution for "heights of college women" recorded to the nearest inch: the first two class midpoints are 62.5" and 65.5". What is the class interval?

A. 1"
B. 2"
C. 2.5"
D. 3"

51. Refer to the following information from a frequency distribution for "heights of college women" recorded to the nearest inch: the first two class midpoints are 62.5" and 65.5". What are the class limits for the lowest class?

A. 61 and up to 64
B. 62 and up to 64
C. 62 and 65
D. 62 and 63

52. Refer to the following information from a frequency distribution for "heights of college women" recorded to the nearest inch: the first two class midpoints are 62.5" and 65.5". What are the class limits for the third class?

A. 64 and up to 67

B. 67 and 69

C. 67 and up to 70

D. 66 and 68

53. Refer to the following distribution:

Cost of Textbooks	Frequency
$25 up to $35	2
35 up to 45	5
45 up to 55	7
55 up to 65	20
65 up to 75	16

What is the relative class frequency for the $25 up to $35 class?

A. .02

B. .04

C. .05

D. .10

54. Refer to the following distribution:

Cost of Textbooks	Frequency
$25 up to $35	2
35 up to 45	5
45 up to 55	7
55 up to 65	20
65 up to 75	16

What is the class midpoint for the $45 up to $55 class?

A. 49

B. 49.5

C. 50

D. 50.5

55. Refer to the following distribution:

Cost of Textbooks	Frequency
$25 up to $35	2
35 up to 45	5
45 up to 55	7
55 up to 65	20
65 up to 75	16

What are the class limits for the class with the highest frequency?

A. 55 up to 64

B. 54 up to 64

C. 55 up to 65

D. 55 up to 64.5

56. Refer to the following frequency distribution on days absent during a calendar year by employees of a manufacturing company:

Days Absent	Number of Employees
0 up to 3	60
3 up to 6	31
6 up to 9	14
9 up to 12	6
12 up to 15	2

How many employees were absent for between 3 up to 6 days?

A. 31

B. 29

C. 14

D. 2

57. Refer to the following frequency distribution on days absent during a calendar year by employees of a manufacturing company:

Days Absent	Number of Employees
0 up to 3	60
3 up to 6	31
6 up to 9	14
9 up to 12	6
12 up to 15	2

How many employees were absent fewer than six days?

A. 60

B. 31

C. 91

D. 46

58. Refer to the following frequency distribution on days absent during a calendar year by employees of a manufacturing company:

Days Absent	Number of Employees
0 up to 3	60
3 up to 6	31
6 up to 9	14
9 up to 12	6
12 up to 15	2

How many employees were absent six days or more?

A. 8
B. 4
C. 22
D. 31

59. Refer to the following frequency distribution on days absent during a calendar year by employees of a manufacturing company:

Days Absent	Number of Employees
0 up to 3	60
3 up to 6	31
6 up to 9	14
9 up to 12	6
12 up to 15	2

How many employees were absent from 6 up to 12 days?

A. 20
B. 8
C. 12
D. 17

60. Refer to the following breakdown of responses to a survey of room service in a hotel.

Response	Frequency
Not Satisfied	20
Satisfied	40
Highly Satisfied	60

What is the class interval for the frequency table above?

A. 10

B. 20

C. 40

D. None Apply

61. Refer to the following breakdown of responses to a survey of room service in a hotel.

Response	Frequency
Not Satisfied	20
Satisfied	40
Highly Satisfied	60

What is the class with the greatest frequency?

A. Not satisfied

B. Satisfied

C. Highly satisfied

D. None Apply

62. Refer to the following breakdown of responses to a survey of room service in a hotel.

Response	Frequency
Not Satisfied	20
Satisfied	40
Highly Satisfied	60

What percent of the responses indicated that customers were satisfied?

A. 40%

B. 33%

C. 50%

D. 100%

63. Refer to the following breakdown of responses to a survey of room service in a hotel.

Response	Frequency
Not Satisfied	20
Satisfied	40
Highly Satisfied	60

What type of chart should be used to describe the frequency table?

A. A pie chart

B. A bar chart

C. A histogram

D. A frequency polygon

64. Refer to the following breakdown of responses to a survey of room service in a hotel.

Response	Frequency
Not Satisfied	20
Satisfied	40
Highly Satisfied	60

What type of chart should be used to show relative class frequencies?

A. A pie chart

B. A bar chart

C. A histogram

D. A frequency polygon

65. Refer to the following breakdown of responses to a survey of "Are you concerned about being tracked while connected to the Internet?"

Response	Frequency
Very concerned	140
Somewhat concerned	40
No concern	20

What is the class interval for the preceding frequency table?

A. 10

B. 20

C. 40

D. None Apply

66. Refer to the following breakdown of responses to a survey of "Are you concerned about being tracked while connected to the Internet?"

Response	Frequency
Very concerned	140
Somewhat concerned	40
No concern	20

What is the class with the greatest frequency?

A. Very concerned

B. Somewhat concerned

C. No concern

D. None Apply

67. Refer to the following breakdown of responses to a survey of "Are you concerned about being tracked while connected to the Internet?"

Response	Frequency
Very concerned	140
Somewhat concerned	40
No concern	20

What percent of the responses indicated that users were somewhat concerned?

A. 40%

B. 70%

C. 20%

D. 100%

68. Refer to the following breakdown of responses to a survey of "Are you concerned about being tracked while connected to the Internet?"

Response	Frequency
Very concerned	140
Somewhat concerned	40
No concern	20

What type of chart should be used to describe the frequency table?

A. A pie chart

B. A bar chart

C. A histogram

D. A frequency polygon

69. Refer to the following breakdown of responses to a survey of "Are you concerned about being tracked while connected to the Internet?"

Response	Frequency
Very concerned	140
Somewhat concerned	40
No concern	20

What type of chart should be used to show relative class frequencies?

A. A pie chart

B. A bar chart

C. A histogram

D. A frequency polygon

70. Refer to the following breakdown of responses to a survey of "How confident are you that you saved enough to retire?"

Response	Frequency
Very confident	63
Somewhat confident	135
Not very confident	99
Don't know	3

What is the class interval for the preceding frequency table?

A. 10

B. 20

C. 40

D. None Apply

71. Refer to the following breakdown of responses to a survey of "How confident are you that you saved enough to retire?"

Response	Frequency
Very confident	63
Somewhat confident	135
Not very confident	99
Don't know	3

What is the class with the greatest frequency?

A. Very confident

B. Somewhat confident

C. Not very confident

D. Don't know

72. Refer to the following breakdown of responses to a survey of "How confident are you that you saved enough to retire?"

Response	Frequency
Very confident	63
Somewhat confident	135
Not very confident	99
Don't know	3

What percent of the responses indicated that users were very confident?

A. 63%

B. 21%

C. 45%

D. 33%

73. Refer to the following breakdown of responses to a survey of "How confident are you that you saved enough to retire?"

Response	Frequency
Very confident	63
Somewhat confident	135
Not very confident	99
Don't know	3

What type of chart should be used to describe the frequency table?

A. A pie chart

B. A bar chart

C. A histogram

D. A frequency polygon

74. Refer to the following breakdown of responses to a survey of "How confident are you that you saved enough to retire?"

Response	Frequency
Very confident	63
Somewhat confident	135
Not very confident	99
Don't know	3

What type of chart should be used to show relative class frequencies?

A. A pie chart

B. A bar chart

C. A histogram

D. A frequency polygon

75. A pie chart shows the _____.

A. Relative frequencies of a qualitative variable

B. Relative frequencies of a quantitative variable

C. Frequencies of a nominal variable

D. Frequencies of a ratio variable

76. A table summarizing a set of data showing the fraction of the total number of items in several classes is a

A. relative frequency distribution.

B. frequency distribution.

C. normal frequency distribution.

D. cumulative frequency distribution.

77. In order to convert class frequency to relative class frequency, we

    A. divide the midpoint of the class by the sample size.
    B. divide the frequency of the class by the midpoint.
    C. divide the sample size by the frequency of the class.
    D. divide the frequency of the class by the sample size.

78. In constructing a frequency distribution, the approximate class width is computed as

    A. (maximum value - minimum value)/(number of classes)
    B. (maximum value - minimum value)/(sample size)
    C. (minimum value - maximum value)/(sample size)
    D. (maximum value)/(number of classes - sample size)

Fill in the Blank Questions

79. In constructing a frequency polygon, class frequencies are scaled on the _____ axis.

    _____

80. A frequency distribution for nominal data requires that the categories be _____ and _____.

    _____

81. For a frequency distribution of quantitative data, if every individual, object, or measurement can be assigned to a class, the frequency distribution is _____.

    _____

82. For a frequency distribution of qualitative data, if the observations can be assigned to only one class, the classes are _____.

_____

83. The number of observations in each class of a frequency distribution is called a _____.

_____

84. A _____ is useful for displaying the relative frequency distribution for a nominal variable.

_____

85. To calculate a relative frequency, a class frequency is divided by _____.

_____

86. In a relative frequency distribution, the sum of the relative class frequencies is _____.

_____

87. A class relative frequency represents a _____ of the total observations in the class.

_____

88. A _____ chart is useful for displaying a frequency distribution for a qualitative variable.

_____

89. A _____ chart is useful for displaying a frequency distribution for a nominal variable.

_____

90. The midpoint of a class interval is also called a class _____.

_____

91. A table showing the number of observations that have been grouped into each of several classes is called a frequency _____.

    _____

92. In a cumulative frequency distribution, the percent of the total frequencies that would fall below the upper limit of the highest class would be _____.

    _____

93. Unorganized data is referred to as _____ data.

    _____

94. When classes in a frequency table are constructed so that each observation will fit into only one class, the categories are _____.

    _____

95. The suggested class interval for a frequency distribution with data ranges from 100 to 220 with 50 observations would be _____.

    _____

96. If the number of observations is 124, calculate the suggested number of classes using the "2 to the k rule."

    _____

97. In a frequency distribution, a class defined as "Under $100" and "$1,000 and over" is called a(n) _____.

    _____

98. In a deck of cards, a class of all cards that are hearts and a class of all cards that are kings are NOT
_____.

_____

99. To construct a histogram, the class frequencies are plotted on the _____.

_____

100. To construct a bar chart, the class frequencies are plotted on the _____.

_____

101. To construct a pie chart, the class frequencies are converted to _____.

_____

102. To summarize the gender of students attending a college in a frequency distribution, a total of at
least _____ classes would be required.

_____

103. A _____ chart is useful for displaying a relative frequency distribution.

_____

Essay Questions

104. Ages (rounded to the nearest whole year) of employees at a large company were grouped into a distribution with the following class limits:

20 up to 30
30 up to 40
40 up to 50
50 up to 60
60 up to 70

The class limits for the class 50 up to 60 are _____ and _____.

105. Ages (rounded to the nearest whole year) of employees at a large company were grouped into a distribution with the following class limits:

20 up to 30
30 up to 40
40 up to 50
50 up to 60
60 up to 70

What is the midpoint for the class 40 up to 50?

106. Ages (rounded to the nearest whole year) of employees at a large company were grouped into a distribution with the following class limits:

20 up to 30
30 up to 40
40 up to 50
50 up to 60
60 up to 70

What is the class interval?

107. The first three class marks for a frequency distribution of "weights of college men" recorded to the nearest pound are 105, 115, and 125.
What is the class interval?

108. The first three class marks for a frequency distribution of "weights of college men" recorded to the nearest pound are 105, 115, and 125.

What is the lower limit for the third class?

109. The first three class marks for a frequency distribution of "weights of college men" recorded to the nearest pound are 105, 115, and 125.

What is the upper limit for the third class?

110. The first three class marks for a frequency distribution of "weights of college men" recorded to the nearest pound are 105, 115, and 125.

What are the class limits for the fourth class?

111. Refer to the following breakdown of responses to a survey of room cleanliness in a hotel.

Response	Frequency
Not Satisfied	20
Satisfied	40
Highly Satisfied	20

What is the class interval for the following frequency table?

112. Refer to the following breakdown of responses to a survey of room cleanliness in a hotel.

Response	Frequency
Not Satisfied	20
Satisfied	40
Highly Satisfied	20

What is the class with the greatest frequency?

113. Refer to the following breakdown of responses to a survey of room cleanliness in a hotel.

Response	Frequency
Not Satisfied	20
Satisfied	40
Highly Satisfied	20

What percent of the responses indicated that customers were satisfied?

114. Refer to the following breakdown of responses to a survey of room cleanliness in a hotel.

Response	Frequency
Not Satisfied	20
Satisfied	40
Highly Satisfied	20

Draw a bar graph that illustrates the preceding frequency table.

115. Refer to the following breakdown of responses to a survey of room cleanliness in a hotel.

Response	Frequency
Not Satisfied	20
Satisfied	40
Highly Satisfied	20

Draw a bar graph that illustrates the relative frequencies.

116. Refer to the following breakdown of responses to a survey of room cleanliness in a hotel.

Response	Frequency
Not Satisfied	20
Satisfied	40
Highly Satisfied	20

Draw a pie chart that illustrates the relative frequencies.

117. A data set consists of 40 observations. For a quantitative variable, how many classes would you recommend for the frequency distribution?

118. A data set has 100 observations. In the data, a quantitative variable's highest value is 117 and its lowest value is 47. What is the minimum class interval that you would recommend?

119. A data set has 200 observations. In the data, a quantitative variable's highest value is 1080 and its lowest value is 960. What is the minimum class interval that you would recommend?

120. A data set has 200 observations. In the data, a qualitative variable's highest value is "extremely satisfied" and its lowest value is "extremely dissatisfied." What is the minimum class interval that you would recommend?

121. The following frequency distribution shows the distribution of delivery times (in days) for swimstuff.com customer orders during the last month.

Delivery times in days	Frequency
0 up to 1	150
1 up to 2	60
2 up to 3	45
3 up to 4	30
4 up to 5	10
5 up to 6	5

How many orders were delivered in less than one day?

122. The following frequency distribution shows the distribution of delivery times (in days) for swimstuff.com customer orders during the last month.

Delivery times in days	Frequency
0 up to 1	150
1 up to 2	60
2 up to 3	45
3 up to 4	30
4 up to 5	10
5 up to 6	5

What is the relative frequency for orders delivered in less than one day?

123. The following frequency distribution shows the distribution of delivery times (in days) for swimstuff.com customer orders during the last month.

Delivery times in days	Frequency
0 up to 1	150
1 up to 2	60
2 up to 3	45
3 up to 4	30
4 up to 5	10
5 up to 6	5

How many orders were delivered in less than three days?

124. The following frequency distribution shows the distribution of delivery times (in days) for swimstuff.com customer orders during the last month.

Delivery times in days	Frequency
0 up to 1	150
1 up to 2	60
2 up to 3	45
3 up to 4	30
4 up to 5	10
5 up to 6	5

What is the relative frequency for orders delivered in less than three days?

125. The following frequency distribution shows the distribution of delivery times (in days) for swimstuff.com customer orders during the last month.

Delivery times in days	Frequency
0 up to 1	150
1 up to 2	60
2 up to 3	45
3 up to 4	30
4 up to 5	10
5 up to 6	5

How many orders were delivered in three days or more?

126. The following frequency distribution shows the distribution of delivery times (in days) for swimstuff.com customer orders during the last month.

Delivery times in days	Frequency
0 up to 1	150
1 up to 2	60
2 up to 3	45
3 up to 4	30
4 up to 5	10
5 up to 6	5

What is the relative frequency for orders delivered in three days or more?

127. The following frequency distribution shows the distribution of delivery times (in days) for swimstuff.com customer orders during the last month.

Delivery times in days	Frequency
0 up to 1	150
1 up to 2	60
2 up to 3	45
3 up to 4	30
4 up to 5	10
5 up to 6	5

How many orders were delivered from 1 day up to 3 days?

128. The following frequency distribution shows the distribution of delivery times (in days) for swimstuff.com customer orders during the last month.

Delivery times in days	Frequency
0 − 1	150
1 − 2	60
2 − 3	45
3 − 4	30
4 − 5	10
5 − 6	5

What is the relative frequency of the orders delivered from 1 day up to 3 days?

129. The following frequency distribution shows the distribution of delivery times (in days) for swimstuff.com customer orders during the last month.

Delivery times in days	Frequency
0 − 1	150
1 − 2	60
2 − 3	45
3 − 4	30
4 − 5	10
5 − 6	5

For 300 observations, our rule-of-thumb for number of classes would indicate 9 classes. In this case, what is the class interval and why would it be reasonable to use that class interval and only 6 classes?

130. What is the difference between a bar chart and a pie chart?

131. What is the difference between a frequency distribution and a cumulative frequency distribution?

132. In a bar chart, why are there spaces between the bars on the horizontal axis?

Chapter 02 Describing Data: Frequency Tables, Frequency Distributions, and Graphic Presentation Answer Key

True / False Questions

1.   A frequency distribution groups data into classes showing the number of observations in each class.

TRUE

2.   A frequency distribution for qualitative data has class limits.

FALSE

Qualitative data is not numeric, so there cannot be class limits.

3. To summarize the gender of students attending a college, the number of classes in a frequency distribution depends on the number of students.

   <u>FALSE</u>

   Gender is a nominal, qualitative variable that has two values. Therefore, there will only be two classes: male and female.

4. In frequency distributions, classes are mutually exclusive if each individual, object, or measurement is included in only one category.

   <u>TRUE</u>

5. In a bar chart, the x-axis is labeled with the values of a qualitative variable.

   <u>TRUE</u>

6.   In a bar chart, the heights of the bars represent the frequencies in each class.

       TRUE

7.   The midpoint of a class, which is also called a class mark, is halfway between the lower and
       upper limits.

       TRUE

8.   A class interval, or class width, can be determined by subtracting the lower limit of a class from
       the lower limit of the next higher class.

       TRUE

9.   To convert a frequency distribution to a relative frequency distribution, divide each class
       frequency by the sum of the class frequencies.

       TRUE

10. To convert a frequency distribution to a relative frequency distribution, divide each class frequency by the number of classes.

    <u>FALSE</u>

    Relative frequencies are computed by dividing class frequencies by the total of the class frequencies.

11. A pie chart is similar to a relative frequency distribution.

    <u>TRUE</u>

12. A pie chart shows the relative frequency in each class.

    <u>TRUE</u>

13.   To construct a pie chart, relative class frequencies are used to graph the "slices" of the pie.

        <u>TRUE</u>

14.   A cumulative frequency distribution is used when we want to determine how many observations lie above or below certain values.

        <u>TRUE</u>

15.   A frequency polygon is a very useful graphic technique when comparing two or more distributions.

        <u>TRUE</u>

Multiple Choice Questions

16. Monthly commissions of first-year insurance brokers are $1,270, $1,310, $1,680, $1,380, $1,410, $1,570, $1,180 and $1,420. These figures are referred to as a(n) _____.

    A. Histogram
    B. Raw data
    C. Frequency distribution
    D. Frequency polygon

Histograms, frequency distributions, and frequency polygons all summarize data. The data in the question are individual observations or raw data that are not summarized.

17. A small sample of computer operators shows monthly incomes of $1,950, $1,775, $2,060, $1,840, $1,795, $1,890, $1,925, and $1,810. What are these ungrouped numbers called?

    A. Histogram
    B. Class limits
    C. Class frequencies
    D. Raw data

Histograms and frequency distributions summarize data. The data in the question are the individual observations that are not summarized.

18. When data is collected using a quantitative, ratio variable, what is true about a frequency distribution that summarizes the data?

    A. Upper and lower class limits must be calculated.
    B. A pie chart can be used to summarize the data.
    C. The number of classes is equal to the number of variable's values.
    D. The "5 to the k rule" can be applied.

The statements "a pie chart can be used to summarize the data" and "the number of classes is equal to the number of variable's values" refer to frequency distributions for qualitative variables. For quantitative, ratio variables, the number of classes, the class interval, and class limits must be computed.

19. When data is collected using a qualitative, nominal variable, what is true about a frequency distribution that summarizes the data?

    A. The upper and lower class limits must be calculated.
    B. A pie chart can be used to summarize the data.
    C. The number of classes is equal to the number of variable's values plus 2.
    D. The "5 to the k rule" can be applied.

A pie chart is used to show the relative frequency for a qualitative, nominal variable. The statements "the upper and lower class limits must be calculated" and "the "5 to the k rule" can be applied" apply to quantitative variables.

20.   When data is collected using a qualitative, nominal variable (in other words, male or female), what is true about a frequency distribution that summarizes the data?

   A. The upper and lower class limits must be calculated.
   B. Class midpoints can be computed.
   <u>C.</u> The number of classes corresponds to the number of a variable's values.
   D. The "2 to the k rule" can be applied.

   Gender is a nominal, qualitative variable that has two values. Therefore, the frequency distribution will only have two classes: male and female.

21. A student was interested in the cigarette smoking habits of college students and collected data from an unbiased random sample of students. The data is summarized in the following table:

Males	50
Females	75
Males who smoke	20
Males who do not smoke	30
Females who smoke	25
Females who do not smoke	50

Why is the table NOT a frequency distribution?

A. The number of males does not equal the sum of males that smoke and do not smoke.
B. The classes are not mutually exclusive.
C. There are too many classes.
D. Class limits cannot be computed.

In a frequency distribution, the classes must be mutually exclusive so that each data item can be assigned to only one class. In this example, the classes are not mutually exclusive because a female can be assigned to two classes: females and females who smoke or females who do not smoke.

22. A student was interested in the cigarette smoking habits of college students and collected data from an unbiased random sample of students. The data is summarized in the following table:

Males who smoke	20
Males who do not smoke	30
Females who smoke	25
Females who do not smoke	50

What type of chart best represents the frequency table?

A. Bar chart
B. Box plot
C. Scatter plot
D. Frequency polygon

The variables are nominal and qualitative. The frequency table is best presented with a bar chart.

AACSB: Communication
Blooms: Understand
Difficulty: 2 Medium
Learning Objective: 02-02 Display a frequency table using a bar or pie chart.
Topic: Graphic Presentation of Qualitative Data

23. A student was interested in the cigarette smoking habits of college students and collected data from an unbiased random sample of students. The data is summarized in the following table:

Males who smoke	20
Males who do not smoke	30
Females who smoke	25
Females who do not smoke	50

What type of chart best represents relative class frequencies?

A. Box plot

B. Pie chart

C. Scatter plot

D. Frequency polygon

The variables are nominal and qualitative. Relative frequencies for a qualitative, nominal variable are best summarized with a pie chart.

24. When a class interval is expressed as 100 up to 200, _____.

A. Observations with values of 100 are excluded from the class

B. Observations with values of 200 are included in the class

C. Observations with values of 200 are excluded from the class

D. The class interval is 99

Class intervals must be interpreted so they are mutually exclusive. The class interval, 100 up to 200, includes values equal to 100 and less than 200.

25.   For a relative frequency distribution, relative frequency is computed as _____.

A. The class width divided by the class interval
B. The class midpoint divided by the class frequency
C. The class frequency divided by the class interval
D. The class frequency divided by the total frequency

By definition, relative frequency is computed as class frequency divided by total frequency.

26.   The relative frequency for a class represents the _____.

A. Class width
B. Class midpoint
C. Class interval
D. Percent of observations in the class

By definition, relative frequency is computed as class frequency divided by total frequency, which is a percent of the total observations in a class.

27. A group of 100 students was surveyed about their interest in a new International Studies program. Interest was measured in terms of high, medium, or low. In the study, 30 students responded high interest, 40 students responded medium interest, and 30 students responded low interest. What is the relative frequency of students with high interest?

A. .30
B. .50
C. .40
D. .030

For calculations, 30 of the 100 students have a high interest, or 30/100 = .30.

28. A group of 100 students were surveyed about their interest in a new Economics major. Interest was measured in terms of high, medium, or low. In the study, 30 students responded high interest, 50 students responded medium interest, and 20 students responded low interest. What is the **best** way to illustrate the relative frequency of student interest?

A. Use a cumulative frequency polygon
B. Use a box plot
C. Use a pie chart
D. Use a frequency table

Interest is a qualitative, nominal variable. The relative frequencies for a qualitative, nominal variable are best summarized with a pie chart.

29. The monthly salaries of a sample of 100 employees were rounded to the nearest $10. They ranged from a low of $1,040 to a high of $1,720. If we want to condense the data into seven classes, what is the most convenient class interval?

   A. $50
   B. $100
   C. $150
   D. $200

   ($1720 - 1040)/7 = $97.14. Of the answer choices, a class interval of $100 is closest to 97.14.

30. A student was studying the political party preferences of a university's student population. The survey instrument asked students to identify themselves as a Democrat or a Republican. This question is flawed because:

   A. Students generally don't know their political preferences.
   B. The categories are generally mutually exclusive.
   C. The categories are not exhaustive.
   D. Political preference is a continuous variable.

   The survey is not exhaustive because it does not include all possible party preferences, such as Independent or Libertarian.

31.   A student was studying the political party preferences of a university's student population. The survey instrument asked students to identify their political preference, for example, Democrat, Republican, Libertarian, or another party. The best way to illustrate the frequencies for each political preference is a _____.

   A. Bar chart
   B. Box plot
   C. Histogram
   D. Frequency polygon

Political preference is a qualitative, nominal variable. Frequencies for a qualitative, nominal variable are best presented with a bar chart.

32. A student was studying the political party preferences of a university's student population. The survey instrument asked students to identify their political preference—for example, Democrat, Republican, Libertarian, or another party. The best way to illustrate the relative frequency distribution is a _____.

A. Bar chart
B. Pie chart
C. Histogram
D. Frequency polygon

Political preference is a qualitative, nominal variable. The relative frequencies for a qualitative, nominal variable are best summarized with a pie chart.

33.   What is the following table called?

Ages	Number of Ages
20 up to 30	16
30 up to 40	25
40 up to 50	51
50 up to 60	80
60 up to 70	20
70 up to 80	8

A. Histogram

B. Frequency polygon

C. Cumulative frequency distribution

D. Frequency distribution

The table is not a graph, such as a histogram or frequency polygon. The table shows the number of people in each class.

34. For the following distribution of heights, what are the limits for the class with the greatest frequency?

Heights	60" up to 65"	65" up to 70"	70" up to 75"
Frequency	10	70	20

A. 64 and up to 70
B. 65 and 69
C. 65 and up to 70
D. 69.5 and 74.5

The frequency table has three classes with frequencies of 10, 70, and 20. The class 65" up to 70" corresponds with the greatest frequency of 70.

35. In a frequency distribution, the number of observations in a class is called the class _____.

A. Midpoint
B. Interval
C. Array
D. Frequency

By definition, frequency is the number of observations in a class.

36.   Why are unequal class intervals sometimes used in a frequency distribution?

A.   To avoid a large number of empty classes
B.   For the sake of variety in presenting the data
C.   To make the class frequencies smaller
D.   To avoid the need for midpoints

When constructing frequency distributions, sometimes there are extreme or outlier values. Therefore, there would be several classes with zero frequencies. To better summarize the data, a class would be created with extended limits that would include the classes with zero frequencies and all the outlier or extreme values.

37. The number of employees less than the upper limit of each class at Lloyd's Fast Food Emporium is shown in the following table:

Ages	Cumulative Number
18 up to 23	6
23 up to 38	19
28 up to 33	52
33 up to 38	61
38 up to 43	65

What is it called?

A. A histogram
B. A cumulative frequency table
C. A pie chart
D. A frequency polygon

The table shows the number of employees in each class or less. So each class frequency is a cumulative total and the table is a cumulative frequency table.

38. A sample distribution of hourly earnings in Paul's Cookie Factory is:

Hourly Earnings	$6 up to $9	$9 up to $12	$12 up to $15
Frequency	16	42	10

The limits of the class with the smallest frequency are:

A. $6.00 and $9.00
B. $12.00 and up to $14.00
C. $11.75 and $14.25
D. $12.00 and up to $15.00

The frequency table has three classes with frequencies of 16, 42, and 10. The class $12 up to $15 corresponds with the smallest frequency of 10.

39.   Refer to the following distribution of commissions:

Monthly Commissions	Class Frequencies
$600 up to $800	3
800 up to 1,000	7
1,000 up to 1,200	11
1,200 up to 1,400	22
1,400 up to 1,600	40
1,600 up to 1,800	24
1,800 up to 2,000	9
2,000 up to 2,200	4

What is the relative frequency for those salespersons that earn from $1,600 up to $1,800?

A. .02
B. .024
C. .20
D. .24

The number 0.20 is found by 24/120. Here, 120 is the total number of salespeople in the distribution.

40. Refer to the following distribution of commissions:

Monthly Commissions	Class Frequencies
$600 up to $800	3
800 up to 1,000	7
1,000 up to 1,200	11
1,200 up to 1,400	22
1,400 up to 1,600	40
1,600 up to 1,800	24
1,800 up to 2,000	9
2,000 up to 2,200	4

To plot a cumulative frequency distribution, the first coordinate would be _____.

A. $X = 0$, $Y = 600$
B. $X = 500$, $Y = 3$
C. $X = 3$, $Y = 600$
D. $X = 600$, $Y = 0$

To plot a cumulative frequency distribution, the first point would show a frequency of zero ($Y = 0$) at the lower limit of the first class.

41. Refer to the following distribution of commissions:

Monthly Commissions	Class Frequencies
$600 up to $800	3
800 up to 1,000	7
1,000 up to 1,200	11
1,200 up to 1,400	22
1,400 up to 1,600	40
1,600 up to 1,800	24
1,800 up to 2,000	9
2,000 up to 2,200	4

What is the relative frequency of those salespersons that earn $1,600 or more?

A. 25.5%
B. 27.5%
C. 29.5%
D. 30.8%

The figure of 30.8%, or 37/120, is found by taking the total of the frequencies for $1,600 or more (24 + 9 + 4) and dividing by the total of 120.

42. Refer to the following distribution of commissions:

Monthly Commissions	Class Frequencies
$600 up to $800	3
800 up to 1,000	7
1,000 up to 1,200	11
1,200 up to 1,400	22
1,400 up to 1,600	40
1,600 up to 1,800	24
1,800 up to 2,000	9
2,000 up to 2,200	4

For the preceding distribution, what is the midpoint of the class with the greatest frequency?

A. 1,400

B. 1,500

C. 1,700

D. The midpoint cannot be determined.

The class with the greatest frequency is "1,400 up to 1,600." The class midpoint is the lower limit (1,400) plus one half of the class interval (1/2 × 200 = 100) or 1,400 + 100 = 1,500.

43. Refer to the following distribution of commissions:

Monthly Commissions	Class Frequencies
$600 up to $800	3
800 up to 1,000	7
1,000 up to 1,200	11
1,200 up to 1,400	22
1,400 up to 1,600	40
1,600 up to 1,800	24
1,800 up to 2,000	9
2,000 up to 2,200	4

What is the class interval?

A. 200
B. 300
C. 3,500
D. 400

The class interval is 200, found by the difference between any consecutive lower or upper class limits.

44.   Refer to the following wage breakdown for a garment factory.

Hourly Wages	Number of Employees
$4 up to $7	18
7 up to 10	36
10 up to 13	20
13 up to 16	6

What is the class interval for the preceding table of wages?

A. $2
B. $3
C. $4
D. $5

The class interval is $3, found by the difference between any consecutive lower or upper class limits.

AACSB: Analytic
Blooms: Understand
Difficulty: 1 Easy
Learning Objective: 02-03 Summarize quantitative variables with frequency and relative frequency distributions.
Topic: Constructing Frequency Distributions

45. Refer to the following wage breakdown for a garment factory.

Hourly Wages	Number of Employees
$4 up to $7	18
7 up to 10	36
10 up to 13	20
13 up to 16	6

What is the class midpoint for the class with the greatest frequency?

A. $5.50

B. $8.50

C. $11.50

D. $14.50

The class with the greatest frequency is "7 up to 10." The class midpoint is the lower limit (7) plus half of the class interval (1/2 × 3 = 1.5) or $7 + 1.5 = $8.50.

46. Refer to the following wage breakdown for a garment factory.

Hourly Wages	Number of Employees
$4 up to $7	18
7 up to 10	36
10 up to 13	20
13 up to 16	6

What are the class limits for the class with the smallest frequencies?

A. 3.5 and 6.5

B. 4 and up to 7

C. 13 and up to 16

D. 12.5 and 15.5

This class has the lowest frequency with 6 wage earners in the class.

AACSB: Communication
Blooms: Understand
Difficulty: 2 Medium
Learning Objective: 02-03 Summarize quantitative variables with frequency and relative frequency distributions.
Topic: Constructing Frequency Distributions

47.   Refer to the following distribution of ages:

Ages	Frequency
40 up to 50	10
50 up to 60	28
60 up to 70	12

For the distribution of ages just shown, what is the relative class frequency for the lowest class?

A. .50
B. .18
C. .20
D. .10

The answer .20, or 10/50, is found by dividing 10 by the total of 50.

48.   Refer to the following distribution of ages:

Ages	Frequency
40 up to 50	10
50 up to 60	28
60 up to 70	12

What is the class interval?

A. 9
B. 10
C. 10.5
D. 11

The class interval is 10, found by the difference between any consecutive lower or upper class limits.

49. Refer to the following distribution of ages:

Ages	Frequency
40 up to 50	10
50 up to 60	28
60 up to 70	12

What is the class midpoint of the highest class?

A. 54
B. 55
C. 64
D. 65

The highest class is "60 up to 70." The class midpoint is the lower limit (60) plus half of the class interval: ½ × 10 = 5, or $60 + 5 = 65.

50. Refer to the following information from a frequency distribution for "heights of college women" recorded to the nearest inch: the first two class midpoints are 62.5" and 65.5". What is the class interval?

A. 1"
B. 2"
C. 2.5"
D. 3"

The class interval can be computed as the difference between adjacent class midpoints (65.5 - 62.5 = 3).

51. Refer to the following information from a frequency distribution for "heights of college women" recorded to the nearest inch: the first two class midpoints are 62.5" and 65.5". What are the class limits for the lowest class?

A. 61 and up to 64
B. 62 and up to 64
C. 62 and 65
D. 62 and 63

Based on the class midpoints, the class interval is 3. The class limit for the lowest class would be the class midpoint less one half of the class interval, or 62.5 - (½ × 3) = 61.

52. Refer to the following information from a frequency distribution for "heights of college women" recorded to the nearest inch: the first two class midpoints are 62.5" and 65.5". What are the class limits for the third class?

   A. 64 and up to 67
   B. 67 and 69
   C. 67 and up to 70
   D. 66 and 68

   Based on the class midpoints, the class interval is 3. The class limit for the lowest class would be the class midpoint less half of the class interval, or 62.5 - (½ × 3) = 61. Then adding the class interval, the lower limit of the second class would be 64 and the lower limit of the third class would be 67. Again, applying the class interval, the upper limit of the third class would be 70.

53.   Refer to the following distribution:

Cost of Textbooks	Frequency
$25 up to $35	2
35 up to 45	5
45 up to 55	7
55 up to 65	20
65 up to 75	16

What is the relative class frequency for the $25 up to $35 class?

A. .02

B. .04

C. .05

D. .10

The class frequency divided by the total observations: 2/50 = 0.04.

54. Refer to the following distribution:

Cost of Textbooks	Frequency
$25 up to $35	2
35 up to 45	5
45 up to 55	7
55 up to 65	20
65 up to 75	16

What is the class midpoint for the $45 up to $55 class?

A. 49

B. 49.5

C. 50

D. 50.5

The class midpoint is the lower limit (45) plus half of the class interval ½ × 10 = 5, or 45 + 5 = 50.

55.   Refer to the following distribution:

Cost of Textbooks	Frequency
$25 up to $35	2
35 up to 45	5
45 up to 55	7
55 up to 65	20
65 up to 75	16

What are the class limits for the class with the highest frequency?

A. 55 up to 64

B. 54 up to 64

C. 55 up to 65

D. 55 up to 64.5

This class with the highest frequency of 20 observations is "55 up to 65."

56. Refer to the following frequency distribution on days absent during a calendar year by employees of a manufacturing company:

Days Absent	Number of Employees
0 up to 3	60
3 up to 6	31
6 up to 9	14
9 up to 12	6
12 up to 15	2

How many employees were absent for between 3 up to 6 days?

A. 31
B. 29
C. 14
D. 2

From the chart, there are 31 employees who were absent 3 up to 6 days.

57. Refer to the following frequency distribution on days absent during a calendar year by employees of a manufacturing company:

Days Absent	Number of Employees
0 up to 3	60
3 up to 6	31
6 up to 9	14
9 up to 12	6
12 up to 15	2

How many employees were absent fewer than six days?

A. 60
B. 31
C. 91
D. 46

To find the number of employees who were absent fewer than six days, add the frequencies for the classes, 0 up to 3 days, and 3 up to 6 days, or 60 + 31 = 91.

58. Refer to the following frequency distribution on days absent during a calendar year by employees of a manufacturing company:

Days Absent	Number of Employees
0 up to 3	60
3 up to 6	31
6 up to 9	14
9 up to 12	6
12 up to 15	2

How many employees were absent six days or more?

A. 8
B. 4
C. 22
D. 31

To find the number of employees who were absent six or more days, add the frequencies for the classes, 6 up to 9 days, and 9 up to 12 days, and 12 up to 15 days, or 14 + 6 + 2 = 22.

59. Refer to the following frequency distribution on days absent during a calendar year by employees of a manufacturing company:

Days Absent	Number of Employees
0 up to 3	60
3 up to 6	31
6 up to 9	14
9 up to 12	6
12 up to 15	2

How many employees were absent from 6 up to 12 days?

A. 20
B. 8
C. 12
D. 17

To find the number of employees who were absent from 6 up to 12 days, add the frequencies for the classes, 6 up to 9 days, and 9 up to 12 days, or 14 + 6 = 20.

60. Refer to the following breakdown of responses to a survey of room service in a hotel.

Response	Frequency
Not Satisfied	20
Satisfied	40
Highly Satisfied	60

What is the class interval for the frequency table above?

A. 10
B. 20
C. 40
D. None Apply

There is no class interval for data measured on an ordinal scale.

61. Refer to the following breakdown of responses to a survey of room service in a hotel.

Response	Frequency
Not Satisfied	20
Satisfied	40
Highly Satisfied	60

What is the class with the greatest frequency?

A. Not satisfied
B. Satisfied
C. Highly satisfied
D. None Apply

The highly satisfied class has 60 people.

AACSB: Communication
Blooms: Understand
Difficulty: 1 Easy
Learning Objective: 02-01 Summarize qualitative variables with frequency and relative frequency tables.
Topic: Constructing Frequency Tables

62.   Refer to the following breakdown of responses to a survey of room service in a hotel.

Response	Frequency
Not Satisfied	20
Satisfied	40
Highly Satisfied	60

What percent of the responses indicated that customers were satisfied?

A. 40%

B. 33%

C. 50%

D. 100%

The answer (33%) is found by dividing the frequency of the satisfied class by the total frequency, or 40/120.

63.   Refer to the following breakdown of responses to a survey of room service in a hotel.

Response	Frequency
Not Satisfied	20
Satisfied	40
Highly Satisfied	60

What type of chart should be used to describe the frequency table?

A. A pie chart

B. A bar chart

C. A histogram

D. A frequency polygon

Bar charts can be used to illustrate a frequency table.

AACSB: Analytic
Blooms: Understand
Difficulty: 1 Easy
Learning Objective: 02-02 Display a frequency table using a bar or pie chart.
Topic: Graphic Presentation of Qualitative Data

64.   Refer to the following breakdown of responses to a survey of room service in a hotel.

Response	Frequency
Not Satisfied	20
Satisfied	40
Highly Satisfied	60

What type of chart should be used to show relative class frequencies?

A. A pie chart

B. A bar chart

C. A histogram

D. A frequency polygon

Pie charts can be used to illustrate relative frequencies for an ordinal variable.

65. Refer to the following breakdown of responses to a survey of "Are you concerned about being tracked while connected to the Internet?"

Response	Frequency
Very concerned	140
Somewhat concerned	40
No concern	20

What is the class interval for the preceding frequency table?

A. 10
B. 20
C. 40
D. None Apply

There is no class interval for data measured on an ordinal scale.

66. Refer to the following breakdown of responses to a survey of "Are you concerned about being tracked while connected to the Internet?"

Response	Frequency
Very concerned	140
Somewhat concerned	40
No concern	20

What is the class with the greatest frequency?

A. Very concerned
B. Somewhat concerned
C. No concern
D. None Apply

The very concerned class has 140 people.

67. Refer to the following breakdown of responses to a survey of "Are you concerned about being tracked while connected to the Internet?"

Response	Frequency
Very concerned	140
Somewhat concerned	40
No concern	20

What percent of the responses indicated that users were somewhat concerned?

A. 40%

B. 70%

C. 20%

D. 100%

The answer (20%) is found by dividing the frequency of the somewhat concerned class by the total frequency, or 40/200.

AACSB: Analytic
Blooms: Understand
Difficulty: 1 Easy
Learning Objective: 02-03 Summarize quantitative variables with frequency and relative frequency distributions.
Topic: Constructing Frequency Distributions

68.   Refer to the following breakdown of responses to a survey of "Are you concerned about being tracked while connected to the Internet?"

Response	Frequency
Very concerned	140
Somewhat concerned	40
No concern	20

What type of chart should be used to describe the frequency table?

A. A pie chart

B. A bar chart

C. A histogram

D. A frequency polygon

Bar charts can be used to illustrate a frequency table.

AACSB: Analytic
Blooms: Understand
Difficulty: 1 Easy
Learning Objective: 02-02 Display a frequency table using a bar or pie chart.
Topic: Graphic Presentation of Qualitative Data

69. Refer to the following breakdown of responses to a survey of "Are you concerned about being tracked while connected to the Internet?"

Response	Frequency
Very concerned	140
Somewhat concerned	40
No concern	20

What type of chart should be used to show relative class frequencies?

A. A pie chart

B. A bar chart

C. A histogram

D. A frequency polygon

Pie charts can be used to illustrate relative frequencies for an ordinal variable.

70. Refer to the following breakdown of responses to a survey of "How confident are you that you saved enough to retire?"

Response	Frequency
Very confident	63
Somewhat confident	135
Not very confident	99
Don't know	3

What is the class interval for the preceding frequency table?

A. 10
B. 20
C. 40
D. None Apply

There is no class interval for data measured on an ordinal scale.

71. Refer to the following breakdown of responses to a survey of "How confident are you that you saved enough to retire?"

Response	Frequency
Very confident	63
Somewhat confident	135
Not very confident	99
Don't know	3

What is the class with the greatest frequency?

A. Very confident

B. Somewhat confident

C. Not very confident

D. Don't know

The Somewhat Confident class with 135 people.

AACSB: Communication
Blooms: Understand
Difficulty: 1 Easy
Learning Objective: 02-01 Summarize qualitative variables with frequency and relative frequency tables.
Topic: Constructing Frequency Tables

72. Refer to the following breakdown of responses to a survey of "How confident are you that you saved enough to retire?"

Response	Frequency
Very confident	63
Somewhat confident	135
Not very confident	99
Don't know	3

What percent of the responses indicated that users were very confident?

A. 63%

B. 21%

C. 45%

D. 33%

The answer (21%) is found by dividing the frequency of the Very Confident class by the total frequency, or 63/300.

73. Refer to the following breakdown of responses to a survey of "How confident are you that you saved enough to retire?"

Response	Frequency
Very confident	63
Somewhat confident	135
Not very confident	99
Don't know	3

What type of chart should be used to describe the frequency table?

A. A pie chart
B. A bar chart
C. A histogram
D. A frequency polygon

Bar charts can be used to illustrate a frequency table.

74. Refer to the following breakdown of responses to a survey of "How confident are you that you saved enough to retire?"

Response	Frequency
Very confident	63
Somewhat confident	135
Not very confident	99
Don't know	3

What type of chart should be used to show relative class frequencies?

A. A pie chart

B. A bar chart

C. A histogram

D. A frequency polygon

Pie charts can be used to illustrate relative frequencies for an ordinal variable.

75. A pie chart shows the _____.

A. Relative frequencies of a qualitative variable

B. Relative frequencies of a quantitative variable

C. Frequencies of a nominal variable

D. Frequencies of a ratio variable

Pie charts can be used to illustrate relative frequencies for qualitative variables.

76. A table summarizing a set of data showing the fraction of the total number of items in several classes is a

    A. relative frequency distribution.
    B. frequency distribution.
    C. normal frequency distribution.
    D. cumulative frequency distribution.

77. In order to convert class frequency to relative class frequency, we

    A. divide the midpoint of the class by the sample size.
    B. divide the frequency of the class by the midpoint.
    C. divide the sample size by the frequency of the class.
    D. divide the frequency of the class by the sample size.

78.   In constructing a frequency distribution, the approximate class width is computed as

   A. (maximum value - minimum value)/(number of classes)
   B. (maximum value - minimum value)/(sample size)
   C. (minimum value - maximum value)/(sample size)
   D. (maximum value)/(number of classes - sample size)

Fill in the Blank Questions

79.   In constructing a frequency polygon, class frequencies are scaled on the _____ axis.

   Y or vertical

   By definition, the Y or vertical axis is labeled as class frequency, while the X or horizontal axis is labeled with class limits or midpoints.

80. A frequency distribution for nominal data requires that the categories be _____ and
    _____.

    <u>exhaustive; mutually exclusive</u>

    By definition, every observation must be included in the distribution (exhaustive) and can belong
    to only one category or class (mutually exclusive).

81. For a frequency distribution of quantitative data, if every individual, object, or measurement can
    be assigned to a class, the frequency distribution is _____.

    <u>exhaustive</u>

    Exhaustive means that all individuals or objects can be assigned to a class in a frequency
    distribution.

82. For a frequency distribution of qualitative data, if the observations can be assigned to only one
    class, the classes are _____.

    <u>mutually exclusive</u>

    By definition, every observation can belong to only one category or class.

83.   The number of observations in each class of a frequency distribution is called a
       _____.

<u>class frequency or frequency</u>

By definition, frequency is the number of times an event occurs within a specific interval.

84.   A _____ is useful for displaying the relative frequency distribution for a nominal variable.

<u>pie chart</u>

In a pie chart, the whole represents 100% that is divided into proportions based on the relative frequencies for each category of a nominal variable.

85.   To calculate a relative frequency, a class frequency is divided by _____.

<u>the total number of observations</u>

By definition, relative frequency is equal to the class frequency divided by the total of the class frequencies, or the total frequency.

86. In a relative frequency distribution, the sum of the relative class frequencies is
_____.

<u>1.00</u>

A relative frequency represents a proportion or percentage of the total. Therefore, the sum of all
the relative frequencies must equal the whole, or 1.00.

AACSB: Communication
Blooms: Apply
Difficulty: 2 Medium
Learning Objective: 02-03 Summarize quantitative variables with frequency and relative frequency distributions.
Topic: Constructing Frequency Distributions

87. A class relative frequency represents a _____ of the total observations in the class.

<u>proportion or percentage</u>

By definition, a proportion or percentage is part of the whole. So, a relative frequency is a class
frequency as a percentage or proportion of the total frequency.

AACSB: Communication
Blooms: Apply
Difficulty: 2 Medium
Learning Objective: 02-03 Summarize quantitative variables with frequency and relative frequency distributions.
Topic: Constructing Frequency Distributions

88. A _____ chart is useful for displaying a frequency distribution for a qualitative variable.

<u>bar</u>

For a frequency distribution, frequencies or counts are clearly illustrated with a bar chart.

AACSB: Communication
Blooms: Apply
Difficulty: 2 Medium
Learning Objective: 02-02 Display a frequency table using a bar or pie chart.

89. A _____ chart is useful for displaying a frequency distribution for a nominal variable.

bar

For a frequency distribution, frequencies or counts are clearly illustrated with a bar chart.

90. The midpoint of a class interval is also called a class _____.

mark

By definition, a class midpoint is the same as a class mark.

91. A table showing the number of observations that have been grouped into each of several classes is called a frequency _____.

distribution

By definition, organizing data by summarizing frequencies in classes is a frequency distribution.

92. In a cumulative frequency distribution, the percent of the total frequencies that would fall below the upper limit of the highest class would be _____.

100%

In a cumulative frequency distribution, the last class is the sum of all frequencies for all lower classes, or 100% of all observations.

AACSB: Communication
Blooms: Understand
Difficulty: 2 Medium
Learning Objective: 02-04 Display a frequency distribution using a histogram or frequency polygon.
Topic: Graphic Presentation of a Frequency Distribution

93. Unorganized data is referred to as _____ data.

raw or ungrouped

A listing of measurements for a sample or population of individuals is considered raw or ungrouped data.

AACSB: Communication
Blooms: Remember
Difficulty: 1 Easy
Learning Objective: 02-01 Summarize qualitative variables with frequency and relative frequency tables.
Topic: Constructing Frequency Tables

94. When classes in a frequency table are constructed so that each observation will fit into only one class, the categories are _____.

mutually exclusive

By definition, mutually exclusive means that an observation, like the gender of a person is female, eliminates the possibility that the person is male. In a frequency table, a person cannot be classified as both female and male. Therefore, the categories are mutually exclusive.

AACSB: Communication
Blooms: Remember

95. The suggested class interval for a frequency distribution with data ranges from 100 to 220 with 50 observations would be _____.

<u>20</u>

The class interval would be (maximum - minimum)/number of classes. Using the "2 to the k rule," there would be 6 classes. So (220 - 100)/6 = 20.

96. If the number of observations is 124, calculate the suggested number of classes using the "2 to the k rule."

<u>7 x classes</u>

2^6 = 64, 2^7 = 128. Since 124 is less than 128, the rule says that we should use 7 classes.

97. In a frequency distribution, a class defined as "Under $100" and "$1,000 and over" is called a(n) _____.

<u>open class</u>

Both examples do not have specified upper or lower limits. So they are "open classes."

98. In a deck of cards, a class of all cards that are hearts and a class of all cards that are kings are NOT _____.

mutually exclusive

The king of hearts is included in both classes. It is a king **and** a heart. Therefore, the classes are not mutually exclusive.

99. To construct a histogram, the class frequencies are plotted on the _____.

Y or vertical axis

To illustrate a frequency distribution with a histogram, class frequencies are plotted on the vertical axis, and the class limits on the horizontal axis.

100.   To construct a bar chart, the class frequencies are plotted on the _____.

<u>Y or vertical axis</u>

To illustrate a frequency distribution with a bar chart, class frequencies are plotted on the vertical axis, and the classes on the horizontal axis.

101.   To construct a pie chart, the class frequencies are converted to _____.

<u>relative frequencies</u>

Pie charts are used to show relative frequencies. So class frequencies must be divided by total frequencies to compute relative frequencies.

102.   To summarize the gender of students attending a college in a frequency distribution, a total of at least _____ classes would be required.

<u>two</u>

For nominal variables, such as gender or color, the number of classes corresponds with the number of values for the nominal variable. A frequency distribution for gender would have two classes: male and female. A frequency distribution of primary colors would have three classes: red, yellow, and blue.

103. A _____ chart is useful for displaying a relative frequency distribution.

<u>pie</u>

Relative frequencies are a percentage or proportion in relation to the whole. A pie chart shows "slices" in proportion to the whole. So a pie chart is useful for displaying a relative frequency distribution.

Essay Questions

104. Ages (rounded to the nearest whole year) of employees at a large company were grouped into a distribution with the following class limits:

20 up to 30
30 up to 40
40 up to 50
50 up to 60
60 up to 70

The class limits for the class 50 up to 60 are _____ and _____.

50, 60

Feedback: By definition, the values are 50 and 60.

AACSB: Communication
Blooms: Understand
Difficulty: 2 Medium
Learning Objective: 02-03 Summarize quantitative variables with frequency and relative frequency distributions.
Topic: Constructing Frequency Distributions

105. Ages (rounded to the nearest whole year) of employees at a large company were grouped into a distribution with the following class limits:

20 up to 30
30 up to 40
40 up to 50
50 up to 60
60 up to 70

What is the midpoint for the class 40 up to 50?

45

Feedback: The class interval is 10, so the midpoint for any class would be half of the class interval added to a class lower limit (in this case, 40 + 5 = 45), or subtracted from a class upper limit (50 - 5 = 45).

AACSB: Analytic
Blooms: Understand
Difficulty: 2 Medium
Learning Objective: 02-03 Summarize quantitative variables with frequency and relative frequency distributions.
Topic: Constructing Frequency Distributions

106. Ages (rounded to the nearest whole year) of employees at a large company were grouped into a distribution with the following class limits:

20 up to 30
30 up to 40
40 up to 50
50 up to 60
60 up to 70

What is the class interval?

10

Feedback: The class interval is the difference between the lower or upper class limits of adjacent classes.

107. The first three class marks for a frequency distribution of "weights of college men" recorded to the nearest pound are 105, 115, and 125.
What is the class interval?

10

Feedback: The class interval is the difference between the class marks or midpoints of adjacent classes. (115 - 105 = 10, or 125 - 115 = 10).

108. The first three class marks for a frequency distribution of "weights of college men" recorded to the nearest pound are 105, 115, and 125.
What is the lower limit for the third class?

120

Feedback: The class interval is 10. The class marks are the same as the class midpoints. Therefore, the upper and lower limits for a class are the class mark plus or minus half of the class interval. For the third class, the lower limit is $125 - \frac{1}{2}(10) = 120$.

109. The first three class marks for a frequency distribution of "weights of college men" recorded to the nearest pound are 105, 115, and 125.
What is the upper limit for the third class?

130

Feedback: The class interval is 10. The class marks are the same as the class midpoints. Therefore, the upper and lower limits for a class are the class mark plus or minus half of the class interval. For the third class, the upper limit is $125 + \frac{1}{2}(10) = 130$.

110. The first three class marks for a frequency distribution of "weights of college men" recorded to the nearest pound are 105, 115, and 125.
What are the class limits for the fourth class?

130 up to 140

Feedback: The class interval is 10. The class marks are the same as the class midpoints. Therefore, the upper and lower limits for a class are the class mark plus or minus half of the class interval. For the third class, the upper limit is 125 + ½(10) = 130. The upper limit for the third class becomes the lower limit for the fourth class. The class interval, 10, is then added to get the upper limit for the fourth class.

111. Refer to the following breakdown of responses to a survey of room cleanliness in a hotel.

Response	Frequency
Not Satisfied	20
Satisfied	40
Highly Satisfied	20

What is the class interval for the following frequency table?

There is no class interval. The variable is qualitative.

Feedback: There is no class interval for data measured on an ordinal scale.

112. Refer to the following breakdown of responses to a survey of room cleanliness in a hotel.

Response	Frequency
Not Satisfied	20
Satisfied	40
Highly Satisfied	20

What is the class with the greatest frequency?

Satisfied

Feedback: The satisfied class with 40 individuals.

113. Refer to the following breakdown of responses to a survey of room cleanliness in a hotel.

Response	Frequency
Not Satisfied	20
Satisfied	40
Highly Satisfied	20

What percent of the responses indicated that customers were satisfied?

50%

Feedback: The satisfied class accounts for 40 of the 80 total individuals. Therefore, 40/80 (or 50%) of the customers were satisfied.

114.   Refer to the following breakdown of responses to a survey of room cleanliness in a hotel.

Response	Frequency
Not Satisfied	20
Satisfied	40
Highly Satisfied	20

Draw a bar graph that illustrates the preceding frequency table.
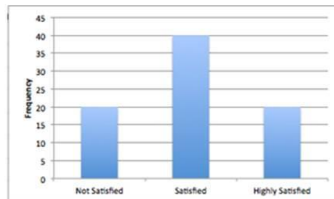
Feedback: A graph with appropriate labels on the horizontal (satisfaction) and vertical (frequency) axes. The bar for "satisfied" should be twice as high as the "not satisfied and highly satisfied" categories, and these categories should be equal in height.

115.   Refer to the following breakdown of responses to a survey of room cleanliness in a hotel.

Response	Frequency
Not Satisfied	20
Satisfied	40
Highly Satisfied	20

Draw a bar graph that illustrates the relative frequencies.

Feedback: A graph with the appropriate labels on the horizontal (satisfaction) and vertical (relative frequency) axes. Bars should show approximate relative frequencies or percentages. The bar for "satisfied" should be twice as high as the "not satisfied and highly satisfied" categories, and these categories should be equal in height.

AACSB: Communication
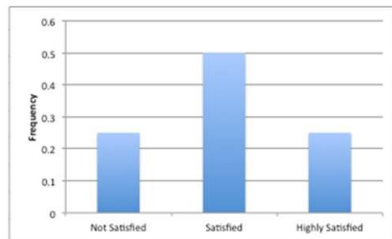*Blooms: Apply*
Difficulty: 1 Easy
Learning Objective: 02-04 Display a frequency distribution using a histogram or frequency polygon.
Topic: Graphic Presentation of a Frequency Distribution

116.   Refer to the following breakdown of responses to a survey of room cleanliness in a hotel.

Response	Frequency
Not Satisfied	20
Satisfied	40
Highly Satisfied	20

Draw a pie chart that illustrates the relative frequencies.

Feedback: The pie chart should be divided into three slices. The "satisfied" slice should be one half of the pie, and the "not satisfied" and "highly satisfied" slices should each be one quarter of the pie. The slices should be labeled.

117.   A data set consists of 40 observations. For a quantitative variable, how many classes would you recommend for the frequency distribution?

Six classes

Feedback: $2^6 = 64$, since 40 is less than 64, the rule says that we should use 6 classes.

118. A data set has 100 observations. In the data, a quantitative variable's highest value is 117 and its lowest value is 47. What is the minimum class interval that you would recommend?

The intermediate answer is 7 classes. The difference between the high and low is 70. So, the class interval is 10.

Feedback: The class interval would be (maximum - minimum)/number of classes. Using the "2 to the k rule," there would be 7 classes (100 is less than 2^7) = 128. So (117 - 47)/7 = 10.

119. A data set has 200 observations. In the data, a quantitative variable's highest value is 1080 and its lowest value is 960. What is the minimum class interval that you would recommend?

The intermediate answer is 8 classes. The difference between the high and low is 120. So, the class interval is 15.

Feedback: The class interval would be (maximum - minimum)/number of classes. Using the "2 to the k rule," there would be 8 classes (200 is less than 2^8) = 256. So (1080 - 960)/8 = 15.

120. A data set has 200 observations. In the data, a qualitative variable's highest value is "extremely satisfied" and its lowest value is "extremely dissatisfied." What is the minimum class interval that you would recommend?

There is no class interval because the variable is qualitative, not quantitative.

Feedback: Qualitative data does not have class intervals or class limits.

121. The following frequency distribution shows the distribution of delivery times (in days) for swimstuff.com customer orders during the last month.

Delivery times in days	Frequency
0 up to 1	150
1 up to 2	60
2 up to 3	45
3 up to 4	30
4 up to 5	10
5 up to 6	5

How many orders were delivered in less than one day?

150

Feedback: For the first class, 0 up to 1 day, there are 150 deliveries.

122.   The following frequency distribution shows the distribution of delivery times (in days) for swimstuff.com customer orders during the last month.

Delivery times in days	Frequency
0 up to 1	150
1 up to 2	60
2 up to 3	45
3 up to 4	30
4 up to 5	10
5 up to 6	5

What is the relative frequency for orders delivered in less than one day?

0.50

Feedback: For the first class, 0 up to 1 day, the relative frequency is 150 divided by the total, 300. Therefore 150/300, or 0.5, is the relative frequency for the first class.

AACSB: Analytic
Blooms: Apply
Difficulty: 1 Easy
Learning Objective: 02-03 Summarize quantitative variables with frequency and relative frequency distributions.
Topic: Constructing Frequency Distributions

123. The following frequency distribution shows the distribution of delivery times (in days) for swimstuff.com customer orders during the last month.

Delivery times in days	Frequency
0 up to 1	150
1 up to 2	60
2 up to 3	45
3 up to 4	30
4 up to 5	10
5 up to 6	5

How many orders were delivered in less than three days?

255

Feedback: The first three classes account for all the deliveries of less than three days. So summing 150, 60, and 45, there were 255 deliveries of less than three days.

124. The following frequency distribution shows the distribution of delivery times (in days) for swimstuff.com customer orders during the last month.

Delivery times in days	Frequency
0 up to 1	150
1 up to 2	60
2 up to 3	45
3 up to 4	30
4 up to 5	10
5 up to 6	5

What is the relative frequency for orders delivered in less than three days?

0.85

Feedback: The first three classes account for all the deliveries of less than three days. So summing 150, 60, and 45, there were 255 deliveries of less than three days. The relative frequency would be 255/300, or 0.85.

AACSB: Analytic
Blooms: Apply
Difficulty: 1 Easy
Learning Objective: 02-03 Summarize quantitative variables with frequency and relative frequency distributions.
Topic: Constructing Frequency Distributions

125. The following frequency distribution shows the distribution of delivery times (in days) for swimstuff.com customer orders during the last month.

Delivery times in days	Frequency
0 up to 1	150
1 up to 2	60
2 up to 3	45
3 up to 4	30
4 up to 5	10
5 up to 6	5

How many orders were delivered in three days or more?

45

Feedback: The three classes, 3 up to 4, 4 up to 5, and 5 up to 6, account for all the deliveries of three days or more. So summing 30, 10, and 5, there were 45 deliveries of three days or more.

AACSB: Analytic
Blooms: Apply
Difficulty: 1 Easy
Learning Objective: 02-04 Display a frequency distribution using a histogram or frequency polygon.
Topic: Graphic Presentation of a Frequency Distribution

126. The following frequency distribution shows the distribution of delivery times (in days) for swimstuff.com customer orders during the last month.

Delivery times in days	Frequency
0 up to 1	150
1 up to 2	60
2 up to 3	45
3 up to 4	30
4 up to 5	10
5 up to 6	5

What is the relative frequency for orders delivered in three days or more?

0.15

Feedback: The three classes, 3 up to 4, 4 up to 5, and 5 up to 6, account for all the deliveries of three days or more. So summing 30, 10, and 5, there were 45 deliveries of three days or more. The relative frequency is 45/300, or 0.15.

AACSB: Analytic
Blooms: Apply
Difficulty: 1 Easy
Learning Objective: 02-03 Summarize quantitative variables with frequency and relative frequency distributions.
Topic: Constructing Frequency Distributions

127. The following frequency distribution shows the distribution of delivery times (in days) for swimstuff.com customer orders during the last month.

Delivery times in days	Frequency
0 up to 1	150
1 up to 2	60
2 up to 3	45
3 up to 4	30
4 up to 5	10
5 up to 6	5

How many orders were delivered from 1 day up to 3 days?

105

Feedback: The two classes, 1 up to 2, and 2 up to 3, account for all the deliveries from 1 up to 3 days. So summing 60 and 45, there were 105 deliveries from 1 up to 3 days.

AACSB: Analytic
Blooms: Apply
Difficulty: 2 Medium
Learning Objective: 02-03 Summarize quantitative variables with frequency and relative frequency distributions.
Topic: Constructing Frequency Distributions

128. The following frequency distribution shows the distribution of delivery times (in days) for swimstuff.com customer orders during the last month.

Delivery times in days	Frequency
0 – 1	150
1 – 2	60
2 – 3	45
3 – 4	30
4 – 5	10
5 – 6	5

What is the relative frequency of the orders delivered from 1 day up to 3 days?

0.35.

Feedback: The two classes, 1 up to 2, and 2 up to 3, account for all the deliveries from 1 up to 3 days. So summing 60 and 45, there were 105 deliveries from 1 up to 3 days. The relative frequency is 105/300, or 0.35.

AACSB: Analytic
Blooms: Apply
Difficulty: 2 Medium
Learning Objective: 02-03 Summarize quantitative variables with frequency and relative frequency distributions.
Topic: Constructing Frequency Distributions

129. The following frequency distribution shows the distribution of delivery times (in days) for swimstuff.com customer orders during the last month.

Delivery times in days	Frequency
0 – 1	150
1 – 2	60
2 – 3	45
3 – 4	30
4 – 5	10
5 – 6	5

For 300 observations, our rule-of-thumb for number of classes would indicate 9 classes. In this case, what is the class interval and why would it be reasonable to use that class interval and only 6 classes?

The class interval is 1 day. The class interval would be reasonable because that is the level of detail that the company uses to measure delivery time. The number of classes would be limited to 6 because there are no deliveries that take six days or more.

130. What is the difference between a bar chart and a pie chart?

A bar chart shows the frequency for the distribution of a qualitative variable. A pie chart shows the relative frequency for the distribution of a qualitative variable. The pie chart is also a great way to make a visual message of the proportions that each variable contributes to the total observations.

Topic: Constructing Frequency Tables

131.   What is the difference between a frequency distribution and a cumulative frequency distribution?

A frequency distribution shows the number of observations in each class. A cumulative frequency distribution shows the sum of the number of observations in a class plus all lower-ranked or -valued classes.

AACSB: Reflective Thinking
Blooms: Analyze
Difficulty: 3 Hard
Learning Objective: 02-04 Display a frequency distribution using a histogram or frequency polygon.
Topic: Graphic Presentation of a Frequency Distribution

132.   In a bar chart, why are there spaces between the bars on the horizontal axis?

A bar chart shows the frequency distribution of a qualitative variable. A qualitative variable is discrete and not continuous. Therefore, placing a space between each bar reflects the fact that a qualitative variable is not continuous.

AACSB: Reflective Thinking
Blooms: Analyze
Difficulty: 3 Hard
Learning Objective: 02-01 Summarize qualitative variables with frequency and relative frequency tables.
Topic: Constructing Frequency Tables