Test Bank for Business Statistics Communicating with Numbers 4th Jaggia

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CORRECT ANSWERS ARE LOCATED IN THE 2ND HALF OF THIS DOC.

TRUE/FALSE - Write 'T' if the statement is true and 'F' if the statement is false.

1) A frequency distribution for a categorical variable groups these data into classes called intervals and records the total number of observations in each class.
   - ◎ true
   - ◎ false

2) The relative frequency of a category is calculated by dividing the category's frequency by the total number of observations.
   - ◎ true
   - ◎ false

3) The percent frequency of a category equals the frequency of the category multiplied by 100%.
   - ◎ true
   - ◎ false

4) A pie chart is a segmented circle that portrays the categories and relative sizes of some numerical variable.
   - ◎ true
   - ◎ false

5) A bar chart depicts the frequency or relative frequency of each category of the categorical variable as a bar rising vertically from the horizontal axis. It is also acceptable for the bar to extend horizontally from the vertical axis.
   - ◎ true
   - ◎ false

6) A bar chart may be displayed horizontally.
   - ◎ true
   - ◎ false

7) A contingency table shows the frequencies for two categorical variables.
   - ◎ true
   - ◎ false

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8) A stacked column chart is an advanced version of a bar chart designed to visualize one numerical variable only.
   - ◎ true
   - ◎ false

9) To approximate the width of a class in the creation of a bar chart, we may use this formula:

   (Maximum value − Minimum value) / Number of classes
   - ◎ true
   - ◎ false

10) For a numerical variable, a relative frequency distribution identifies the proportion of observations that fall into each class.
   - ◎ true
   - ◎ false

11) For a numerical variable, a cumulative relative frequency distribution records the proportion (fraction) of values that fall below the upper limit of each class.
   - ◎ true
   - ◎ false

12) A histogram is a series of rectangles where the width and height of each rectangle represent the frequency (or relative frequency) and the width of the respective class.
   - ◎ true
   - ◎ false

13) A polygon connects a series of neighboring points where each point represents the midpoint of a particular class and its associated frequency or relative frequency.
   - ◎ true
   - ◎ false

14) An ogive is a graph that plots the cumulative frequency (or the cumulative relative frequency) of each class above the lower limit of the corresponding class.
   - ◎ true
   - ◎ false

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15) A stem-and-leaf diagram is useful in that it gives an overall picture of where the observations of a numerical variable are centered and how the data are dispersed from the center.
- ◎ true
- ◎ false

16) A scatterplot is a graphical tool that helps determine whether or not two numerical variables are related.
- ◎ true
- ◎ false

17) When constructing a scatterplot for two numerical variables, we usually refer to one variable as *x* and another one as *y*. Typically, we graph *x* on the vertical axis and *y* on the horizontal axis.
- ◎ true
- ◎ false

18) When constructing a pie chart, only a few, the most frequent, categories must be included in the pie.
- ◎ true
- ◎ false

19) When visualizing a numerical variable, it is always better to have up to 30 classes in a frequency distribution.
- ◎ true
- ◎ false

20) Scatterplot is a graphical tool that is useful to show the relationship between two numerical variables, but has no way to incorporate a categorical variable.
- ◎ true
- ◎ false

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

21) Frequency distributions may be used to describe which of the following types of data?
- A) Nominal and ordinal data only
- B) Nominal and interval data only
- C) Nominal, ordinal, and interval data only
- D) Nominal, ordinal, interval, and ratio data

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22) In order to summarize a categorical variable, a useful tool is a _____.
A) histogram
B) frequency distribution
C) stem-and-leaf diagram
D) line chart

23) For both categorical and numerical variables, what is the difference between the relative frequency and the percent frequency?
A) The relative frequency equals the percent frequency multiplied by 100.
B) The percent frequency equals the relative frequency multiplied by 100.
C) As opposed to the relative frequency, the percent frequency is divided by the number of observations in the data set.
D) As opposed to the percent frequency, the relative frequency is divided by the number of observations in the data set.

24) For which of the following data sets will a pie chart be *most* useful?
A) Heights of high school freshmen
B) Ambient temperatures in the U.S. Capitol Building
C) Percentage of net sales by product for Lenovo in Year 1
D) Growth rates of firms in a particular industry

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25) An auto parts chain asked customers to complete a survey rating the chain's customer service as average, above average, or below average. The following shows the results from the survey:

Average	Below Average	Average
Above Average	Above Average	Above Average
Below Average	Average	Average
Below Average	Average	Below Average
Below Average	Below Average	Below Average

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The proportion of customers who felt the customer service was Average is the closest to _____.

A) 0.20
B) 0.33
C) 0.46
D) 0.53

26) An auto parts chain asked customers to complete a survey rating the chain's customer service as average, above average, or below average. The following table shows the results from the survey.

Average	Below Average	Average
Above Average	Above Average	Above Average
Below Average	Average	Average
Below Average	Average	Below Average
Below Average	Below Average	Below Average

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A rating of Average or Above Average accounted for what number of responses to the survey?

A) 3
B) 7
C) 8
D) 10

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27) The following is a list of five of the world's busiest airports by passenger traffic for Year 1.

Name	Location	Number of Passengers (in millions)
Hartsfield-Jackson	Atlanta, Georgia, United States	89
Capital International	Beijing, China	74
London Heathrow	London, United Kingdom	67
O'Hare	Chicago, Illinois, United States	66
Tokyo	Tokyo, Japan	64

The percentage of passenger traffic in the five busiest airports that occurred in Asia is the closest to _____.

A) 18%
B) 21%
C) 25%
D) 38%

28) The following is a list of five of the world's busiest airports by passenger traffic for Year 1.

Name	Location	Number of Passengers (in millions)
Hartsfield-Jackson	Atlanta, Georgia, United States	89
Capital International	Beijing, China	74
London Heathrow	London, United Kingdom	67
O'Hare	Chicago, Illinois, United States	66
Tokyo	Tokyo, Japan	64

How many more millions of passengers flew out of Atlanta than flew out of Chicago?

A) 13
B) 21
C) 23
D) 25

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29) A city in California spent $7 million repairing damage to its public buildings in Year 1. The following table shows the categories where the money was directed.

Cause	Percent
Termites	21%
Water Damage	4%
Mold	13%
Earthquake	17%
Other	45%

How much did the city spend to fix damage caused by mold?

A) $455,000
B) $1,820,000
C) $2,100,000
D) $910,000

30) A city in California spent $6 million repairing damage to its public buildings in Year 1. The following table shows the categories where the money was directed.

Cause	Percent
Termites	22%
Water Damage	6%
Mold	12%
Earthquake	27%
Other	33%

How much did the city spend to fix damage caused by mold?

A) $360,000
B) $720,000
C) $1,440,000
D) $1,800,000

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31) A city in California spent $6 million repairing damage to its public buildings in Year 1. The following table shows the categories where the money was directed.

Cause	Percent
Termites	22%
Water Damage	6%
Mold	12%
Earthquake	27%
Other	33%

How much more did the city spend to fix damage caused by termites compared to the damage caused by water?

A) $360,000
B) $720,000
C) $960,000
D) $1,320,000

32) Students in Professor Smith's business statistics course have evaluated the overall effectiveness of the professor's instruction on a five-point scale, where a score of 1 indicates very poor performance and a score of 5 indicates outstanding performance. The raw scores are displayed in the accompanying table:

5	3	4	1	1	1	1	5	3	3
2	1	1	1	5	5	3	4	3	5
1	2	4	5	2	3	2	4	4	1

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What is the most common score given in the evaluations?

A) 2
B) 1
C) 3
D) 4

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33) Students in Professor Smith's business statistics course have evaluated the overall effectiveness of the professor's instruction on a five-point scale, where a score of 1 indicates very poor performance and a score of 5 indicates outstanding performance. The raw scores are displayed in the accompanying table:

1	4	4	5	5	3	4	3	4	1
5	5	4	4	2	3	3	2	3	3
4	5	5	5	5	3	2	3	3	2

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What is the most common score given in the evaluations?

A) 2
B) 3
C) 4
D) 5

34) Students in Professor Smith's business statistics course have evaluated the overall effectiveness of the professor's instruction on a five-point scale, where a score of 5 indicates outstanding performance. The raw scores are displayed in the accompanying table.

1	4	4	5	5	3	4	3	4	1
5	5	4	4	2	3	3	2	3	3
4	5	5	5	5	3	2	3	3	2

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What percentage of students gave Professor Smith an evaluation higher than 3?

A) 20%
B) 30%
C) 50%
D) 80%

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35) Students in Professor Smith's business statistics course have evaluated the overall effectiveness of the professor's instruction on a five-point scale, where a score of 1 indicates very poor performance and a score of 5 indicates outstanding performance. The raw scores are displayed in the accompanying table.

1	4	4	5	5	3	4	3	4	1
5	5	4	4	2	3	3	2	3	3
4	5	5	5	5	3	2	3	3	2

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What percentage of students gave Professor Smith an evaluation of 2 or less?

A) 6.7%
B) 13.3%
C) 20%
D) 80%

36) Students in Professor Smith's business statistics course have evaluated the overall effectiveness of the professor's instruction on a five-point scale, where a score of 1 indicates very poor performance and a score of 5 indicates outstanding performance. The raw scores are displayed in the accompanying table:

1	4	4	5	5	3	4	3	4	1
5	5	4	4	2	3	3	2	3	3
4	5	5	5	5	3	2	3	3	2

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What is the relative frequency of the students who gave Professor Smith an evaluation of 3?

A) 0.3
B) 0.5
C) 9
D) 15

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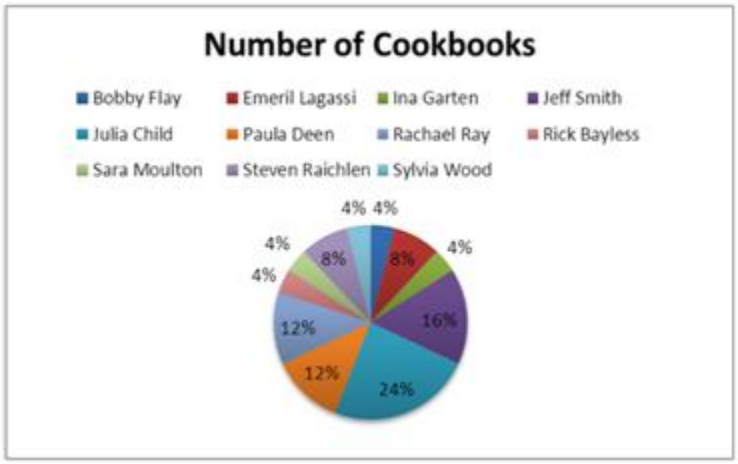
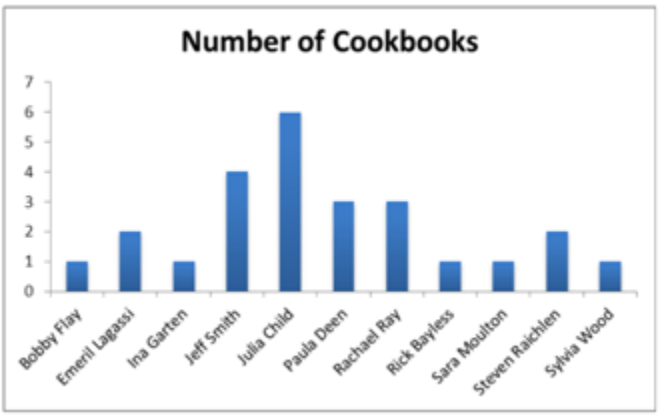
37) In the following pie chart representing a collection of cookbooks, which author has more titles?



A) Jeff Smith
B) Julia Child
C) Rachael Ray
D) Paula Deen

38) The accompanying chart shows the numbers of books written by each author in a collection of cookbooks. What type of chart is this?



A) Bar chart for qualitative data
B) Bar chart for quantitative data
C) Frequency histogram for qualitative data
D) Frequency histogram for quantitative data

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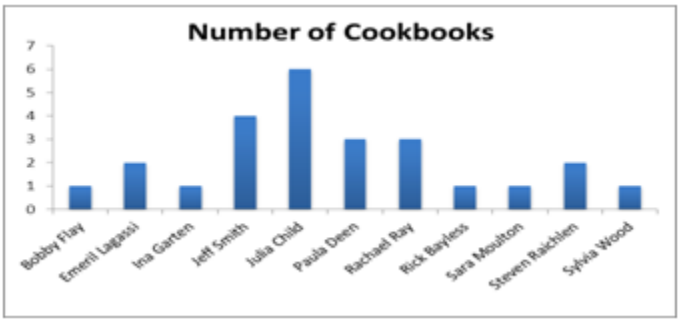
39) The accompanying chart shows the number of books written by each author in a collection of cookbooks. What type of data is being represented?



A) Quantitative, ordinal
B) Quantitative, ratio
C) Qualitative, nominal
D) Qualitative, ordinal

40) Horizontal bar charts are constructed by placing _____.
A) each category on the vertical axis and the appropriate range of values on the horizontal axis
B) each category on the horizontal axis and the appropriate range of values on the vertical axis
C) each interval of values on the vertical axis and the appropriate range of values on the horizontal axis
D) each interval of values stacking on top of one another

41) When constructing a frequency distribution for a numerical variable, it is important to remember that _____.
A) classes are mutually exclusive
B) classes are overlapping
C) the total number of classes cannot be 15
D) the total number of classes should be at least 100

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42) Which of the following best describes a frequency distribution for a categorical variable?

A) It groups data into histograms and records the proportion (fraction) of observations in each histogram.
B) It groups data into categories and records the number of observations in each category.
C) It groups data into intervals called classes and records the proportion (fraction) of observations in each class.
D) It groups data into intervals called classes and records the number of observations in each class.

43) What graphical tool is *best* used to display the relative frequency of a numerical variable?

A) Ogive
B) Pie chart
C) Bar chart
D) Histogram

44) The following data represent scores on a pop quiz in a statistics section.

33	68	74	88	78	45	54	64	35	89
64	57	90	23	25	67	68	47	39	26

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Suppose the data on quiz scores will be grouped into five classes. The width of the classes for a frequency distribution or histogram is the closest to _____.

A) 12
B) 16
C) 14
D) 10

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45) The following data represent scores on a pop quiz in a statistics section.

45	66	74	72	62	44	55	70	33	82
56	56	84	16	16	47	32	32	17	37

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Suppose the data on quiz scores will be grouped into five classes. The width of the classes for a frequency distribution or histogram is the closest to _____.

A) 10
B) 12
C) 14
D) 16

46) The following data represent scores on a pop quiz in a statistics section:

45	66	74	72	62	44	55	70	33	82
56	56	84	16	16	47	32	32	17	37

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Suppose the data are grouped into five classes, and one of them will be "30 up to 44"—that is, $\{x; 30 \le x < 44\}$. The frequency of this class is _____.

A) 0.20
B) 0.25
C) 4
D) 5

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47) The following data represent scores on a pop quiz in a statistics section.

45	66	74	72	62	44	55	70	33	82
56	56	84	16	16	47	32	32	17	37

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Suppose the data are grouped into five classes, and one of them will be "30 up to 44"—that is, $\{x; 30 \le x < 44\}$. The relative frequency of this class is _____.

A) 0.20
B) 0.25
C) 4
D) 5

48) The following data represent the recent sales price (in $1,000s) of 24 homes in a Midwestern city.

184	119	158	168	213	138	209	230
226	149	181	202	219	177	117	157
114	176	196	243	122	205	194	244

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Suppose the data on house prices will be grouped into five classes. The width of the classes for a frequency distribution or histogram is the closest to _____.

A) 26
B) 21
C) 16
D) 31

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49) The following data represent the recent sales price (in $1,000s) of 24 homes in a Midwestern city.

187	125	165	170	230	139	195	229
239	135	188	210	228	172	127	139
122	181	196	237	115	199	170	239

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Suppose the data on house prices will be grouped into five classes. The width of the classes for a frequency distribution or histogram is the closest to _____.

A) 15
B) 20
C) 25
D) 30

50) The following data represent the recent sales price (in $1,000s) of 24 homes in a Midwestern city

187	125	165	170	230	139	195	229
239	135	188	210	228	172	127	139
122	181	196	237	115	199	170	239

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Suppose the data are grouped into five classes, and one of them will be "115 up to 140"—that is, $\{x; 115 \le x < 140\}$. The relative frequency of this class is _____.

A) 6/24
B) 7/24
C) 6
D) 7

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51) The following data represent the recent sales price (in $1,000s) of 24 homes in a Midwestern city.

187	125	165	170	230	139	195	229
239	135	188	210	228	172	127	139
122	181	196	237	115	199	170	239

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Suppose the data are grouped into five classes, and one of them will be "165 up to 190"—that is, $\{x; 165 \leq x < 190\}$. The frequency of this class is _____.

A) 6/24
B) 7/24
C) 6
D) 7

52) Thirty students at Eastside High School took the SAT on the same Saturday. Their raw scores are given next.

1,600	1,960	2,280	2,190	2,270	1,680	2,140	1,780	1,770	1,560
1,940	2,300	1,660	2,280	1,670	2,060	1,750	1,410	2,270	1,610
1,540	2,060	2,320	2,050	1,420	1,620	1,510	2,010	1,950	2,050

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Consider a frequency distribution of the data that groups the data in classes of 1,400 up to 1,600, 1,600 up to 1,800, 1,800 up to 2,000, and so on. How many students scored at least 1,800 but less than 2,000?

A) 5
B) 3
C) 9
D) 4

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53) Thirty students at Eastside High School took the SAT on the same Saturday. Their raw scores are given next.

1,450	1,620	1,800	1,740	1,650	1,710	1,900	1,910	1,950	1,820
1,800	2,010	1,780	1,840	1,490	1,590	2,350	2,260	1,870	1,530
1,620	1,480	2,390	1,640	1,830	1,950	2,000	1,830	1,980	2,100

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Consider a frequency distribution of the data that groups the data in classes of 1,400 up to 1,600, 1,600 up to 1,800, 1,800 up to 2,000, and so on. How many students scored at least 1,800 but less than 2,000?

A) 3
B) 7
C) 12
D) 18

54) Thirty students at Eastside High School took the SAT on the same Saturday. Their raw scores are given next.

1,450	1,620	1,800	1,740	1,650	1,710	1,900	1,910	1,950	1,820
1,800	2,010	1,780	1,840	1,490	1,590	2,350	2,260	1,870	1,530
1,620	1,480	2,390	1,640	1,830	1,950	2,000	1,830	1,980	2,100

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Consider a frequency distribution of the data that groups the data in classes of 1,400 up to 1,600, 1,600 up to 1,800, 1,800 up to 2,000, and so on. What percent of students scored less than 2,200?

A) 10%
B) 20%
C) 80%
D) 90%

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55) Thirty students at Eastside High School took the SAT on the same Saturday. Their raw scores are given next.

1,450	1,620	1,800	1,740	1,650	1,710	1,900	1,910	1,950	1,820
1,800	2,010	1,780	1,840	1,490	1,590	2,350	2,260	1,870	1,530
1,620	1,480	2,390	1,640	1,830	1,950	2,000	1,830	1,980	2,100

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Consider a frequency distribution of the data that groups the data in classes of 1,400 up to 1,600, 1,600 up to 1,800, 1,800 up to 2,000, and so on. What is the approximate relative frequency of students who scored more than 1,600 but less than 1,800?

A) 0.17
B) 0.23
C) 0.40
D) 0.77

56) Thirty students at Eastside High School took the SAT on the same Saturday. Their raw scores are given next.

1,450	1,620	1,800	1,740	1,650	1,710	1,900	1,910	1,950	1,820
1,800	2,010	1,780	1,840	1,490	1,590	2,350	2,260	1,870	1,530
1,620	1,480	2,390	1,640	1,830	1,950	2,000	1,830	1,980	2,100

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Consider a frequency distribution of the data that groups the data in classes of 1,400 up to 1,600, 1,600 up to 1,800, 1,800 up to 2,000, and so on. What graphical tool would you use to display the cumulative relative frequency of the grouped data?

A) Ogive
B) Polygon
C) Pie chart
D) Bar chart

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57) Consider the following frequency distribution.

Class	Frequency
12 up to 15	8
15 up to 18	7
18 up to 21	8
21 up to 24	7
24 up to 27	8

The total number of observations in the frequency distribution is _____.

A) 38
B) 42
C) 23
D) 24

58) Consider the following frequency distribution.

Class	Frequency
12 up to 15	3
15 up to 18	6
18 up to 21	3
21 up to 24	4
24 up to 27	4

The total number of observations in the frequency distribution is _____.

A) 5
B) 6
C) 20
D) 24

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59) Consider the following frequency distribution.

Class	Frequency
12 up to 15	3
15 up to 18	6
18 up to 21	3
21 up to 24	4
24 up to 27	4

How many observations are at least 15 but less than 18?

A) 3
B) 4
C) 5
D) 6

60) Consider the following frequency distribution.

Class	Frequency
12 up to 15	3
15 up to 18	6
18 up to 21	3
21 up to 24	4
24 up to 27	4

How many observations are less than 21?

A) 6
B) 12
C) 18
D) 24

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61) Consider the following frequency distribution.

Class	Frequency
12 up to 15	3
15 up to 18	6
18 up to 21	3
21 up to 24	4
24 up to 27	4

What proportion of the observations are at least 15 but less than 18?

A) 0.20
B) 0.25
C) 0.30
D) 0.35

62) Consider the following frequency distribution.

Class	Frequency
12 up to 15	3
15 up to 18	6
18 up to 21	3
21 up to 24	4
24 up to 27	4

What proportion of the observations are less than 21?

A) 0.30
B) 0.60
C) 0.90
D) 1.00

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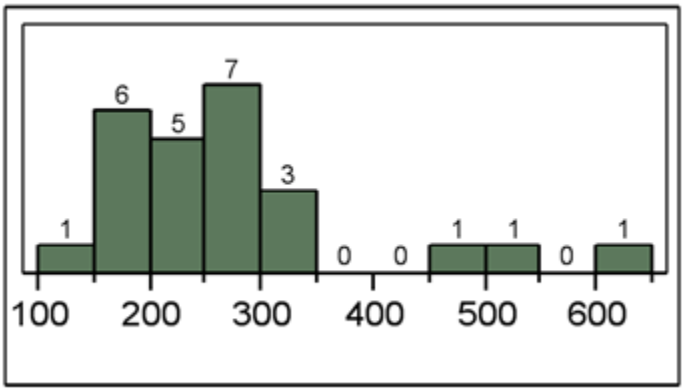
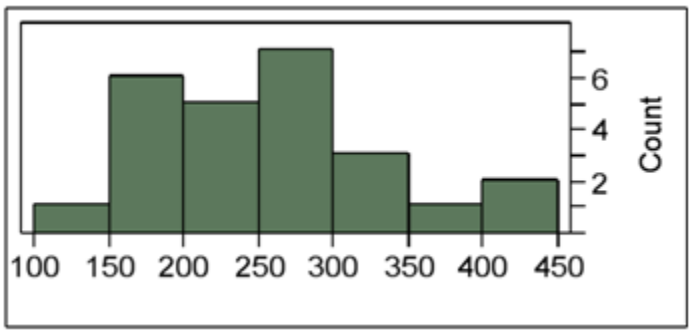
63) The following histogram represents the number of pages in each book within a collection. What is the frequency of books containing at least 250 but fewer than 300 pages?



A) 5
B) 6
C) 7
D) 12

64) The following histogram represents the number of pages in each book within a collection. What is the frequency of books containing at least 200 but fewer than 250 pages?



A) 4
B) 5
C) 6
D) 7

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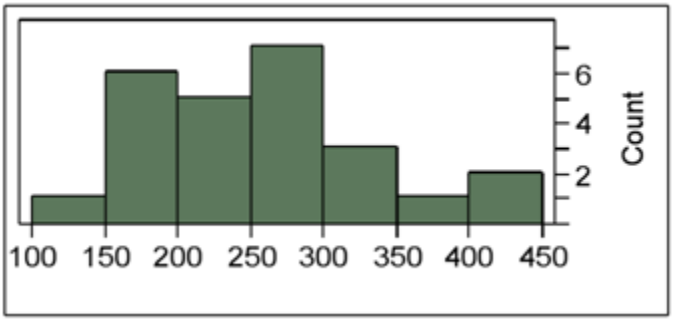
65) The following histogram represents the number of pages in each book within a collection. What is the frequency of books containing at least 250 but fewer than 400 pages?



A) 7
B) 10
C) 11
D) 12

66) An analyst constructed the following frequency distribution on the monthly returns for 50 selected stocks.

Class (in percent)	Frequency
−10 up to 0	9
0 up to 10	23
10 up to 20	14
20 up to 30	8

The number of stocks with returns of 0% up to 10% is _____.

A) 8
B) 9
C) 14
D) 23

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67) An analyst constructed the following frequency distribution on the monthly returns for 50 selected stocks.

Class (in percent)	Frequency
-10 up to 0	8
0 up to 10	25
10 up to 20	15
20 up to 30	2

The number of stocks with returns of 0% up to 10% is _____.

A) 2
B) 8
C) 15
D) 25

68) An analyst constructed the following frequency distribution on the monthly returns for 50 selected stocks.

Class (in percent)	Frequency
-10 up to 0	8
0 up to 10	25
10 up to 20	15
20 up to 30	2

The number of stocks with returns of less than 10% is _____.

A) 8
B) 25
C) 33
D) 48

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69) An analyst constructed the following frequency distribution on the monthly returns for 50 selected stocks:

Class (in percent)	Frequency
-10 up to 0	8
0 up to 10	25
10 up to 20	15
20 up to 30	2

The proportion of stocks with returns of 0% up to 10% is _____.

A) 0.30
B) 0.50
C) 0.66
D) 0.80

70) An analyst constructed the following frequency distribution on the monthly returns for 50 selected stocks.

Class (in percent)	Frequency
-10 up to 0	8
0 up to 10	25
10 up to 20	15
20 up to 30	2

The proportion of stocks with returns of less than 10% is _____.

A) 0.30
B) 0.50
C) 0.66
D) 0.80

Business Statistics Communicating with Numbers Edition 4 by Jaggia

71) Automobiles traveling on a road with a posted speed limit of 65 miles per hour are checked for speed by a state police radar system. The following table is a frequency distribution of speeds.

Speed (miles per hour)	Frequency
45 up to 55	55
55 up to 65	317
65 up to 75	277
75 up to 85	23

How many of the cars traveled less than 75 miles per hour?

A) 324
B) 274
C) 649
D) 674

72) Automobiles traveling on a road with a posted speed limit of 65 miles per hour are checked for speed by a state police radar system. The following table is a frequency distribution of speeds.

Speed (miles per hour)	Frequency
45 up to 55	50
55 up to 65	325
65 up to 75	275
75 up to 85	25

How many of the cars traveled less than 75 miles per hour?

A) 275
B) 325
C) 650
D) 675

Business Statistics Communicating with Numbers Edition 4 by Jaggia

73) Automobiles traveling on a road with a posted speed limit of 65 miles per hour are checked for speed by a state police radar system. The following table is a frequency distribution of speeds.

Speed (miles per hour)	Frequency
45 up to 55	50
55 up to 65	325
65 up to 75	275
75 up to 85	25

What proportion of the cars traveled at least 55 but less than 65 miles per hour?

A) 0.33
B) 0.48
C) 0.56
D) 0.80

74) When using a polygon to visualize a numerical variable, what does each point represent?

A) The lower limit of a particular class and its width
B) The midpoint of a particular class and its associated frequency or relative frequency
C) The midpoint of a particular class and its associated cumulative frequency or cumulative relative frequency
D) The upper limit of a particular class and its associated cumulative frequency or cumulative relative frequency

75) The accompanying table shows students' scores from the final exam in a history course.

Scores	Cumulative Frequency
50 up to 60	12
60 up to 70	37
70 up to 80	61
80 up to 90	85
90 up to 100	100

How many of the students scored at least 70 but less than 90?

A) 17
B) 48
C) 81
D) 24

Business Statistics Communicating with Numbers Edition 4 by Jaggia

76) The accompanying table shows students' scores from the final exam in a history course.

Scores	Cumulative Frequency
50 up to 60	12
60 up to 70	33
70 up to 80	64
80 up to 90	88
90 up to 100	100

How many of the students scored at least 70 but less than 90?

A) 24
B) 31
C) 55
D) 88

77) The following table shows the number of payroll jobs the government added during the years it added jobs (since 1973). The jobs are in thousands.

Jobs Added	Frequency
100 up to 200	5
200 up to 300	8
300 up to 400	7
400 up to 500	5
500 up to 600	1

Approximately what percent of the time did the government add 200,000 or more jobs?

A) 19%
B) 50%
C) 77%
D) 81%

Business Statistics Communicating with Numbers Edition 4 by Jaggia

78) The accompanying relative frequency distribution represents the last year car sales for the sales force at Kelly's Mega Used Car Center.

Car Sales	Relative Frequency
35 up to 45	0.08
45 up to 55	0.13
55 up to 65	0.27
65 up to 75	0.16
75 up to 85	0.36

If Kelly's employs 100 salespeople, how many of these salespeople have sold at least 35 but fewer than 45 cars in the last year?

A) 11
B) 6
C) 8
D) 16

79) The accompanying relative frequency distribution represents the last year car sales for the sales force at Kelly's Mega Used Car Center.

Car Sales	Relative Frequency
35 up to 45	0.07
45 up to 55	0.15
55 up to 65	0.31
65 up to 75	0.22
75 up to 85	0.25

If Kelly's employs 100 salespeople, how many of these salespeople have sold at least 35 but fewer than 45 cars in the last year?

A) 5
B) 7
C) 10
D) 15

Business Statistics Communicating with Numbers Edition 4 by Jaggia

80) The accompanying relative frequency distribution represents the last year car sales for the sales force at Kelly's Mega Used Car Center.

Car Sales	Relative Frequency
35 up to 45	0.07
45 up to 55	0.15
55 up to 65	0.31
65 up to 75	0.22
75 up to 85	0.25

If Kelly's employs 100 salespeople, how many of these salespeople have sold at least 45 but fewer than 65 cars in the last year?

A) 15
B) 31
C) 40
D) 46

81) The accompanying relative frequency distribution represents the last year car sales for the sales force at Kelly's Mega Used Car Center.

Car Sales	Relative Frequency
35 up to 45	0.07
45 up to 55	0.15
55 up to 65	0.31
65 up to 75	0.22
75 up to 85	0.25

If Kelly's employs 100 salespeople, how many of these salespeople have sold at least 65 cars in the last year?

A) 22
B) 25
C) 31
D) 47

Business Statistics Communicating with Numbers Edition 4 by Jaggia

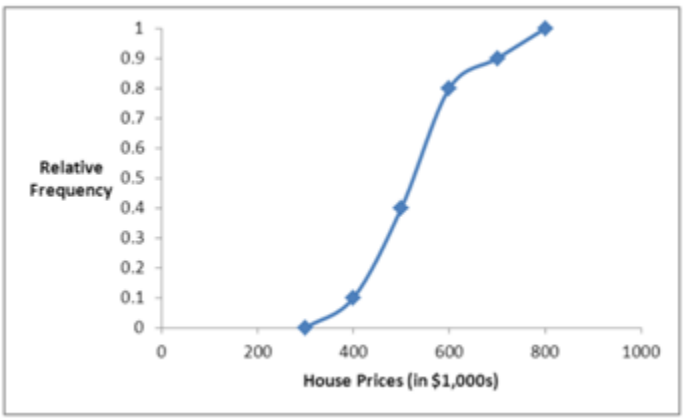
82) When visualizing a numerical variable, what is an ogive used to plot?

A) Frequency or relative frequency of each class against the midpoint of the corresponding class
B) Cumulative frequency or cumulative relative frequency of each class against the upper limit of the corresponding class
C) Frequency or relative frequency of each class against the midpoint of the corresponding class and cumulative frequency or cumulative relative frequency of each class against the upper limit of the corresponding class
D) Cumulative frequency or cumulative relative frequency of each class against the lower limit of the corresponding class

83) How does an ogive differ from a polygon?

A) An ogive is used for qualitative data, while a polygon is used for numerical data.
B) An ogive is used for quantitative data, while a polygon is used for categorical data.
C) An ogive is a graphical depiction of a frequency or relative distribution, while a polygon is a graphical depiction of a cumulative frequency or cumulative relative frequency distribution.
D) An ogive is a graphical depiction of a cumulative frequency or cumulative relative frequency distribution, while a polygon is a graphical depiction of a frequency or relative frequency distribution.

84) Recent home sales in a suburb of Washington, D.C., are shown in the accompanying ogive.

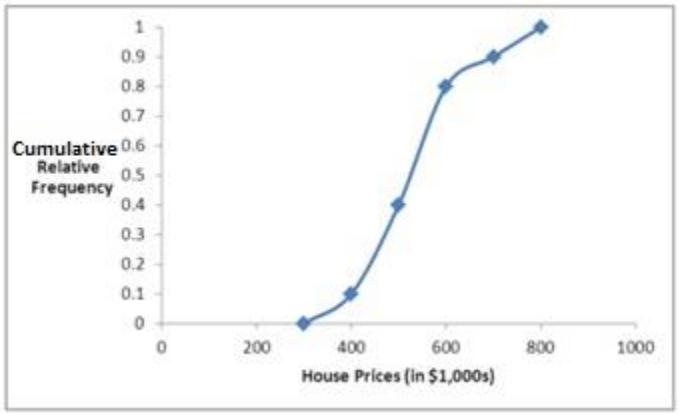


Approximate the percentage of houses that sold for less than $600,000.

A) 60%
B) 70%
C) 80%
D) 90%

Business Statistics Communicating with Numbers Edition 4 by Jaggia

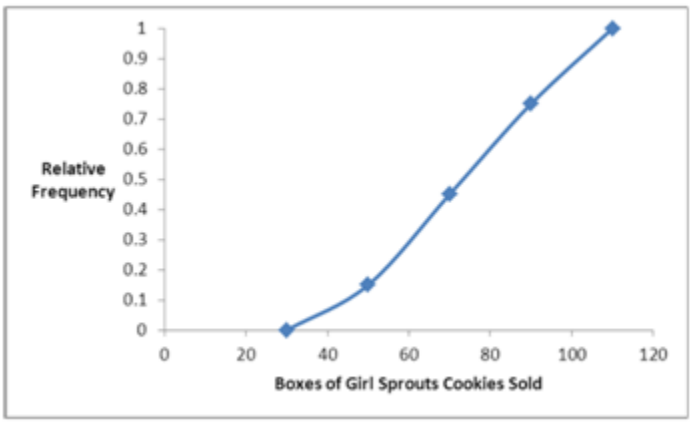
85) Recent home sales in a suburb of Washington, D.C., are shown in the accompanying ogive.



Approximate the percentage of houses that sold for more than $500,000.

A) 40%
B) 50%
C) 60%
D) 70%

86) The organization of the Girl Scouts has completed its annual cookie drive. The sales are reported in the accompanying ogive.

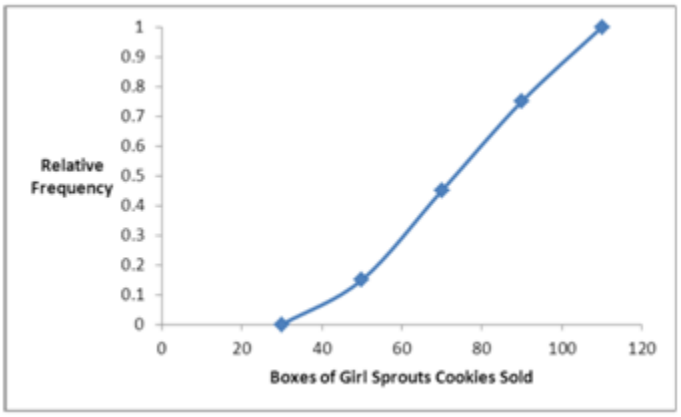


Approximate the percentage of girls who sold fewer than 90 boxes of cookies.

A) 45%
B) 55%
C) 65%
D) 75%

Business Statistics Communicating with Numbers Edition 4 by Jaggia

87) The organization of the Girl Scouts has completed its annual cookie drive. The sales are reported in the accompanying ogive.



Approximate the percentage of girls who sold more than 70 boxes of cookies.

A) 45%
B) 55%
C) 65%
D) 75%

88) A stem-and-leaf diagram is constructed by separating each value of a data set into two parts. What are these parts?

A) Stem consisting of the last digit and leaf consisting of the leftmost digits
B) Stem consisting of the leftmost digits and leaf consisting of the second digit
C) Stem consisting of the second digit and leaf consisting of the last digit
D) Stem consisting of the leftmost digits and the leaf consists of the remaining digits.

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89) In the accompanying stem-and-leaf diagram, the values in the stem and leaf portions represent 10s and 1s digits, respectively.

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

Which of the following numbers appears in the stem-and-leaf diagram?

A) 35
B) 3,500
C) 3.5
D) 350

90) In the accompanying stem-and-leaf diagram, the values in the stem and leaf portions represent 10s and 1s digits, respectively.

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

Which of the following numbers appears in the stem-and-leaf diagram?

A) 3800
B) 380
C) 38
D) 3.8

Business Statistics Communicating with Numbers Edition 4 by Jaggia

91) In the accompanying stem-and-leaf diagram, the values in the stem-and-leaf portions represent 10s and 1s digits, respectively.

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

What would be the frequency of the class 35 up to 45, that is $\{x; 35 \le x < 45\}$?

A) 0
B) 1
C) 2
D) 3

92) In the accompanying stem-and-leaf diagram, the values in the stem-and-leaf portions represent 10s and 1s digits, respectively.

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

How many values are at least 25 but less than 35?

A) 10
B) 11
C) 12
D) 13

Business Statistics Communicating with Numbers Edition 4 by Jaggia

93) In the accompanying stem-and-leaf diagram, the values in the stem-and-leaf portions represent 10s and 1s digits, respectively.

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

Find the frequency associated with data values that are more than 28.

A) 8
B) 9
C) 10
D) 11

94) In the accompanying stem-and-leaf diagram, the values in the stem-and-leaf portions represent 10s and 1s digits, respectively.

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

The stem-and-leaf diagram shows that the distribution is _____.

A) symmetric
B) positively skewed
C) negatively skewed
D) bimodal

Business Statistics Communicating with Numbers Edition 4 by Jaggia

95) The following stem-and-leaf diagram shows the speeds in miles per hour (mph) of 14 cars approaching a toll booth on a bridge in Oakland, California.

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

How many of the cars were traveling faster than 25 mph but slower than 40 mph?

A) 6
B) 7
C) 8
D) 10

96) The following stem-and-leaf diagram shows the speeds in miles per hour (mph) of 14 cars approaching a toll booth on a bridge in Oakland, California.

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

How many of the cars were traveling faster than 25 mph but slower than 40 mph?

A) 8
B) 9
C) 10
D) 12

Business Statistics Communicating with Numbers Edition 4 by Jaggia

97) The following stem-and-leaf diagram shows the last 20 dividend payments (in cents) paid by Procter and Gamble.

Stem	Leaf
3	1 5 5 5 5
4	0 0 0 0 4 4 4 4 4 8 8 8
5	3 3 3

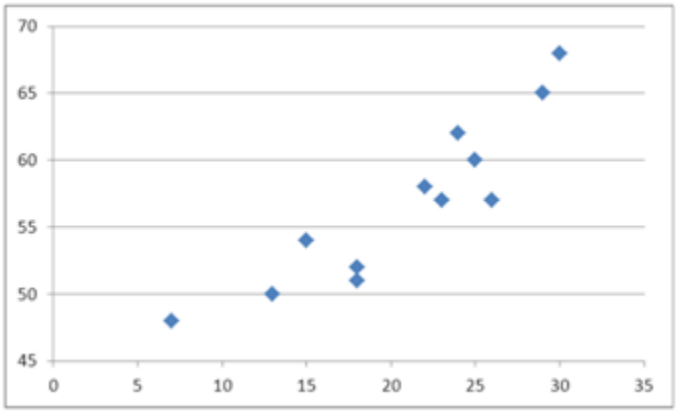
The most common dividend payment is _____.

A) 0.35
B) 0.40
C) 0.44
D) 0.48

98) What may NOT be revealed from a scatterplot?

A) No relationship between two variables
B) A linear relationship between two variables
C) A curvilinear relationship between two variables
D) A causal relationship between two variables

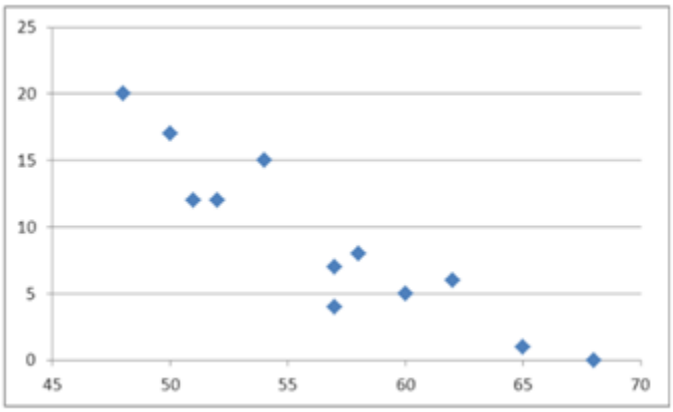
99) What type of relationship is indicated in the scatterplot?



A) No relationship
B) A negative linear relationship
C) A negative curvilinear relationship
D) A positive linear or curvilinear relationship

Business Statistics Communicating with Numbers Edition 4 by Jaggia

100) What type of relationship is indicated in the scatterplot?



A) No relationship
B) A negative linear relationship
C) A positive linear relationship
D) A positive curvilinear relationship

101) Use the following data to construct a scatterplot. What type of relationship is implied?

x	3	6	10	14	18	23
y	34	28	20	12	5	0

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A) No relationship
B) A positive relationship
C) A negative relationship
D) There is not enough information to answer

102) Use the following data to construct a scatterplot. What type of relationship is implied?

x	1	5	9	14	18	23
y	2	4	15	12	15	20

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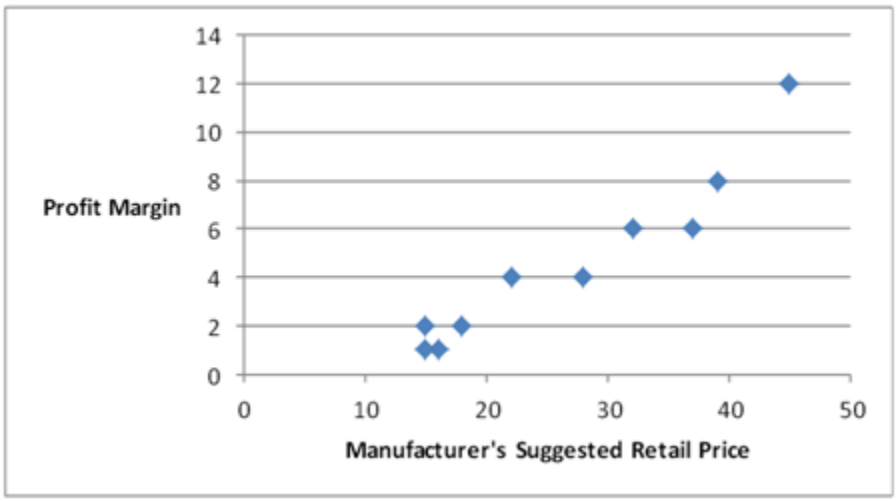
A) No relationship
B) A positive relationship
C) A negative relationship
D) Not enough information to answer

Business Statistics Communicating with Numbers Edition 4 by Jaggia

103) A car dealership created a scatterplot showing the manufacturer's retail price and profit margin for the cars they have on their lot.

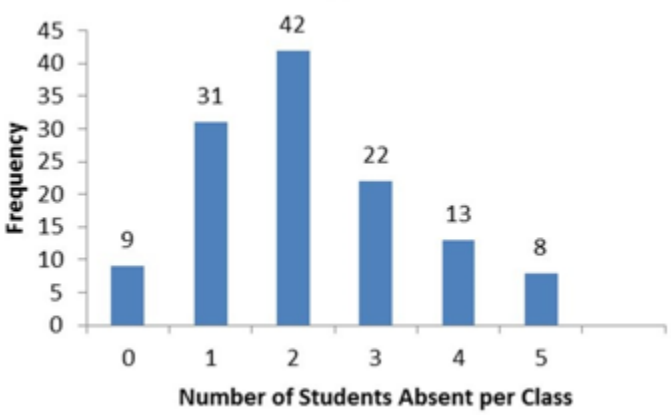


As the manufacturer's suggested retail price increases, the profit margin tends to _____.

A) increase
B) decrease
C) stay the same
D) oscillate

Business Statistics Communicating with Numbers Edition 4 by Jaggia

104) The statistics professor has kept attendance records and recorded the number of absent students per class. The recorded data is displayed in the following bar chart with the frequency of each number of absent students shown above the bars.



How many statistics classes had three or more students absent?

A) 8
B) 13
C) 22
D) 43

105) The following table shows the percentage of e-mail that is sent each day of the business week according to an Intermedia survey.

Day	Percentage
Monday	15%
Tuesday	23%
Wednesday	22%
Thursday	21%
Friday	19%

Which of the following best displays this data?

A) Horizontal bar chart
B) Vertical bar chart
C) Pie chart
D) Histogram

Business Statistics Communicating with Numbers Edition 4 by Jaggia

106) The following frequency distribution displays the weekly sales of a certain brand of television at an electronics store.

Number Sold	Frequency
01-05	5
06-10	14
11-15	7
16-20	8
21-25	16

How many weeks of data are included in this frequency distribution?

A) 25
B) 100
C) 50
D) 75

107) The following frequency distribution displays the weekly sales of a certain brand of television at an electronics store.

Number Sold	Frequency
01-05	3
06-10	7
11-15	14
16-20	22
21-25	4

How many weeks of data are included in this frequency distribution?

A) 25
B) 50
C) 75
D) 100

Business Statistics Communicating with Numbers Edition 4 by Jaggia

108) The following frequency distribution shows the frequency of the asking price, in thousands of dollars, for current homes on the market in a particular city.

Asking Price	Frequency
$350 up to $400	5
$400 up to $450	11
$450 up to $500	9
$500 up to $550	7
$550 up to $600	10

What percentage of houses has an asking price between $350,000 and under $400,000?

A) 21.0%
B) 6.5%
C) 11.9%
D) 23.4%

109) The following frequency distribution shows the frequency of the asking price, in thousands of dollars, for current homes on the market in a particular city.

Asking Price	Frequency
$350 up to $400	12
$400 up to $450	9
$450 up to $500	17
$500 up to $550	11
$550 up to $600	6

What percentage of houses has an asking price between $350,000 and under $400,000?

A) 16.4%
B) 21.8%
C) 30.9%
D) 33.3%

Business Statistics Communicating with Numbers Edition 4 by Jaggia

110) The following frequency distribution shows the frequency of the asking price, in thousands of dollars, for current homes on the market in a particular city.

Asking Price	Frequency
$350 up to $400	12
$400 up to $450	9
$450 up to $500	17
$500 up to $550	11
$550 up to $600	6

What percentage of houses has an asking price under $550,000?

A) 50.5%
B) 69.1%
C) 89.1%
D) 95.0%

111) A survey conducted by CBS news asked 1,026 respondents: "What would you do with an unexpected tax refund?" The responses are summarized in the following table.

Category	Percentage
Pay off debts	47%
Put it in the bank	30%
Spend it	11%
I never get a refund	10%
Other	2%

How many people will either put it in the bank or spend it?

A) 421
B) 411
C) 113
D) 482

Business Statistics Communicating with Numbers Edition 4 by Jaggia

112) The manager at a water park constructed the following frequency distribution to summarize attendance in July and August.

Attendance	Frequency
1,000 up to 1,250	5
1,250 up to 1,500	6
1,500 up to 1,750	10
1,750 up to 2,000	20
2,000 up to 2,250	15
2,250 up to 2,500	4

What of the following is the most likely attendance range?

A) 2,000 up to 2,500
B) 1,000 up to 1,750
C) 1,250 up to 1,750
D) 1,750 up to 2,000

113) The Statistical Abstract of the United States provided the following frequency distribution of the number of people who live below the poverty level by region.

Region	Number of People (in 1000s)
Northeast	6,166
Midwest	7,237
South	15,501
West	8,372

What is the percentage of people who live below the poverty level in the West or Midwest?

A) 35.96%
B) 41.87%
C) 41.58%
D) 31.96%

Business Statistics Communicating with Numbers Edition 4 by Jaggia

114) Consider the following stem-and-leaf diagram.

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

Which data value occurs most often?

A) 1
B) 56
C) 31
D) 63

115) Consider the following stem-and-leaf diagram.

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

Which of the following statements is correct?

A) There is a total of 10 data values in this data set.
B) The data value that occurs most often is 50.
C) This largest data value is 59.
D) The range 50-59 contains the most values.

116) Which of the following methods best describe the relationship between two categorical variables?

A) A pie chart
B) A bar chart
C) A stacked column chart
D) A column chart

Business Statistics Communicating with Numbers Edition 4 by Jaggia

117) The Chief Diversity Officer of an accounting firm wants to make sure gender equity is achieved among all levels of positions of the firm. The Officer has information on an employee's gender, position level, and marital status as shown below:

Employee	Gender	Position Level	Marital Status
1	Male	Top	Widowed
2	Female	Bottom	Married
:	:	:	:
5000	Male	Middle	Single

Which of the following methods is best to help determine the firm's status on gender equity?

A) A contingency table by Gender and Position Level.
B) A stacked column chart by Gender and Marital Status.
C) A frequency distribution of Position Level.
D) A column chart by Gender.

118) Which of the following is *not* a graphical technique to display numerical data?

A) stem-and-leaf
B) histogram
C) scatterplot
D) bar chart

FILL IN THE BLANK. Write the word or phrase that best completes each statement or answers the question.

119) For a categorical variable, a frequency distribution groups its values into _____ and records the number of _____.

120) Graphically, we can show a(n) _____ _____ for a categorical variable by constructing a pie chart or a bar chart.

121) When constructing a frequency distribution for a numerical variable, classes are mutually _____ and _____.

122) A _____ _____ is a table that shows the number of data observations that fall into specific interval.

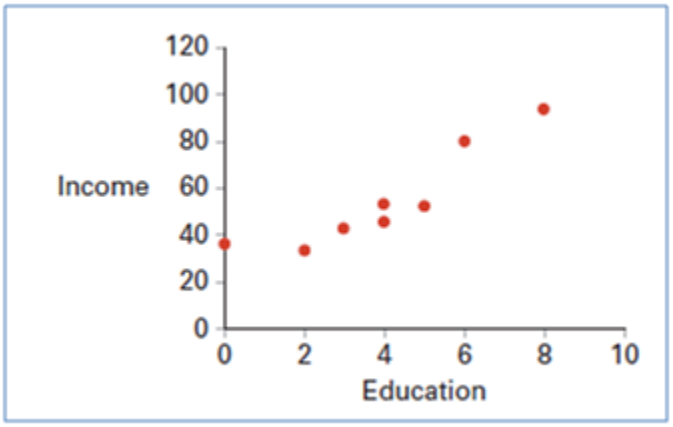
123) The shape of most data distributions can be categorized as either _____ or _____.

Business Statistics Communicating with Numbers Edition 4 by Jaggia

124) A stem-and-leaf diagram most resembles a(n) _____.

125) A scatterplot depicts a positive _____ relationship, if as *x* increases, *y* tends to increase at an increasing rate.

126)



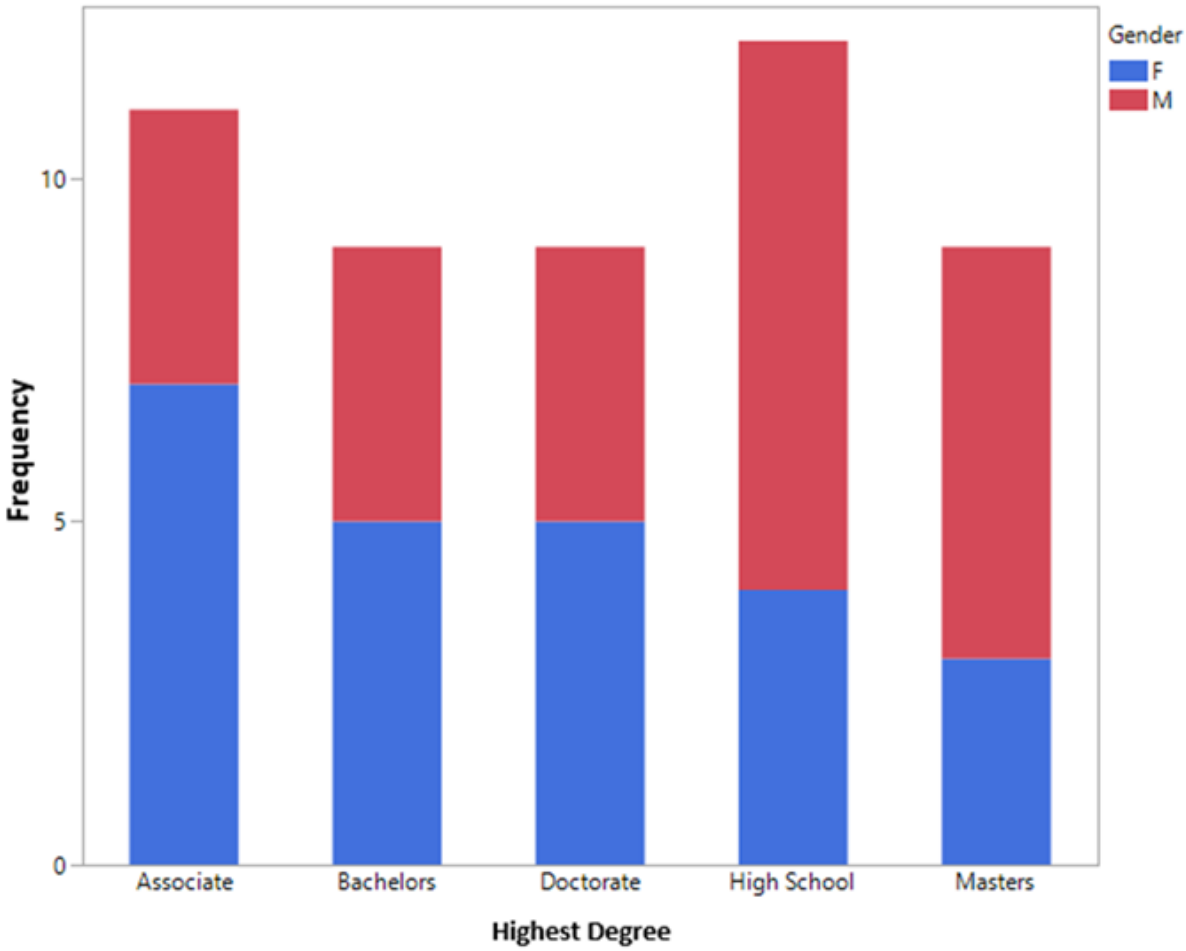
Using a scatterplot above we observe a _____ linear relationship between two variables: Education and Income.

127) Using the contingency table below, we observe that most of the _____ have High School as their highest level of education.

Employed	Highest Education					
	Associate	Bachelors	Doctorate	High School	Masters	All
No	4	4	4	7	4	23
Yes	7	5	5	5	5	27
All	11	9	9	12	9	50

Business Statistics Communicating with Numbers Edition 4 by Jaggia

128) Using the stacked column chart below, we observe that more _____ than _____ have a Masters degree.



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

129) A survey of 400 unemployed people was completed at a job fair. Each person was asked to categorize his or her job interests. The accompanying relative frequency distribution was constructed.

Field	Relative Frequency
Management	0.15
Business and financial operations	0.20
Computer and mathematical	0.10
Life, physical, and social science	0.30
Community and social service	0.25

a. Outside of Connect, construct the corresponding frequency distribution. How many of these people designated that the computer and mathematical industry was their job interest?

b. By hand or in Excel, construct a pie chart.

Business Statistics Communicating with Numbers Edition 4 by Jaggia

130) A hair stylist records the hair color of her 25 most recent appointments, classifying the color as blonde, brown, black, or red. Her data set is displayed next.

Red	Blonde	Black	Red	Blonde
Blonde	Black	Blonde	Red	Blonde
Brown	Black	Red	Blonde	Brown
Brown	Red	Black	Black	Red
Brown	Black	Brown	Blonde	Blonde

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a. Outside of Connect, construct a frequency and relative frequency distribution of the hair color of the stylist's customers. What is the frequency and relative frequency of each hair color?
b. By hand or in Excel, construct a pie chart. Which hair color is the most common among the stylist's customers?

c. By hand or in Excel, create a bar chart to display the frequency distribution. How many customers had black hair?

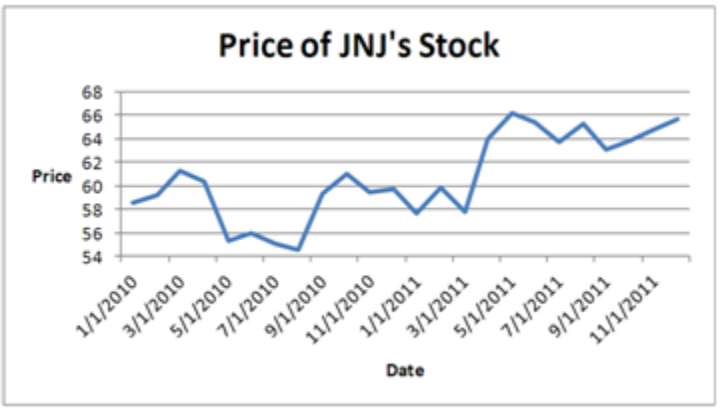
Business Statistics Communicating with Numbers Edition 4 by Jaggia

131) The following table lists some of the busiest ports in the world based on the number of containers in Year 1.

Location of Port	Number of Containers (in millions)
Shanghai	29
Singapore	28
Hong Kong	24
Rotterdam	11
Los Angeles	7
New York	5

By hand or in Excel, construct a pie chart to summarize the data. Approximately what percent of the total number of containers go through Hong Kong?

132) Johnson and Johnson (JNJ) is a consumer staples company. Consumer staples are products people need and buy even during times of financial hardship. Do you think JNJ will have a volatile stock price? Does the accompanying graph accurately depict the volatility of JNJ stock? Explain.



Business Statistics Communicating with Numbers Edition 4 by Jaggia

133) Each month the Bureau of Labor Statistics reports the number of people (in thousands) employed in the United States by age. The accompanying frequency distribution shows the results for August.

Age	Frequency
16 to 19	4,794
20 to 24	13,273
25 to 34	30,789
35 to 44	30,021
45 to 54	32,798
55 and over	28,660

a. Outside of Connect, construct a relative frequency distribution. What proportion of workers is between 20 and 24 years old?
b. Outside of Connect, construct a cumulative relative frequency distribution. What proportion of workers is younger than 35 years old?
c. By hand or in Excel, construct a relative frequency histogram.

Business Statistics Communicating with Numbers Edition 4 by Jaggia

134) The following table displays the top 40 American League batting averages of the last season.

Player	Batting Average	Player	Batting Average
Miguel Cabrera	0.344	Yunel Escobar	0.290
Adrian Gonzalez	0.338	Vladimir Guerrero	0.290
Michael Young	0.338	Alberto Callaspo	0.288
Victor Martinez	0.33	Howard Kendrick	0.285
Jacoby Ellsbury	0.321	Jeff Francoeur	0.285
David Ortiz	0.309	Nick Markakis	0.284
Dustin Pedroia	0.307	Michael Cuddyer	0.284
Casey Kotchman	0.306	Adam Jones	0.280
Melky Cabrera	0.305	Elvis Andrus	0.279
Alex Gordon	0.303	Erick Aybar	0.279
Jose Bautista	0.302	Juan Pierre	0.279
Robinson Cano	0.302	Matt Joyce	0.277
Paul Konerko	0.300	Asdrubal Cabrera	0.273
Jhonny Peralta	0.299	Edwin Encarnacion	0.272
Josh Hamilton	0.298	Ichiro Suzuki	0.272
Derek Jeter	0.297	Peter Bourjos	0.271
Adrian Beltre	0.296	J.J. Hardy	0.269
Alex Avila	0.295	Alexei Ramirez	0.269
Eric Hosmer	0.293	Ben Zobrist	0.269
Billy Butler	0.291	Delmon Young	0.268

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a. Outside of Connect, construct frequency, relative frequency, and cumulative relative frequency distributions that group the data in classes of 0.265 up to 0.280, 0.280 up to 0.295, 0.295 up to 0.310, and so on.
b. How many of these players have a batting average above 0.340? What proportion of these players has a batting average of at least 0.280 but below 0.295? What percentage of these players has a batting average below 0.325?
c. Construct a relative frequency histogram. Is the distribution symmetric? If not, is it positively or negatively skewed?
d. By hand or in Excel, construct an ogive. Using the ogive, approximately what proportion of the players in this group has a batting average above 0.290?

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135) The following table shows analyst sentiment ratings for the 30 stocks listed in the Dow Jones Industrial Average.

7	4	6	8	4	9	4	2	2	4
6	4	5	6	5	3	8	4	9	6
2	9	7	8	4	3	9	4	6	7

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a. Outside of Connect, construct a frequency distribution, relative frequency distribution, cumulative frequency distribution, and relative cumulative frequency distribution using classes of 2 up to 4, 4 up to 6, 6 up to 8, and 8 up to 10.
b. Outside of Connect, construct a histogram that summarizes the data. What percentage of the stocks in the Dow Jones Industrial Average received a sentiment rating less than 8?
c. What percentage of the stocks in the Dow Jones Industrial Average received a sentiment rating of 6 or more?

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136) The accompanying cumulative relative frequency distribution shows a summary of the scores from an Algebra II exam at a local high school. Twenty students took the exam.

Class	Cumulative Relative Frequency
51 - 60	0.05
61 - 70	0.20
71 - 80	0.45
81 - 90	0.80
91 - 100	1.00

a. Outside of Connect, construct the relative frequency distribution. What proportion of students scored between 81 and 90?
b. Outside of Connect, construct the frequency distribution. How many students scored between 71 and 80?
c. By hand or in Excel, construct an ogive. What is the approximate percentage of students that scored less than 85?

137) The dividend yields of the stocks in an investor's portfolio are shown in the following cumulative relative frequency distribution.

Dividend Yields	Cumulative Relative Frequency
0% up to 2%	0.55
2% up to 4%	0.85
4% up to 6%	0.90
6% up to 8%	0.96
8% up to 10%	1.00

By hand or in Excel, construct an ogive. Approximately what percent of the stocks had a dividend yield of 3% or larger?

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138) Outside of Connect, construct a stem-and-leaf diagram with the following data set.

3.2	1.3	2.1	2.4	4.3	3.1	3.2	1.1	1.4	2.5
2.4	2.9	3.8	1.7	2.3	1.2	3.2	1.4	1.5	2.6

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Is the distribution symmetric?

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

139) Outside of Connect, construct a stem-and-leaf diagram for the following data set.

74	75	63	62	56	79	58	79	53	49
78	69	74	72	53	72	64	65	67	77

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Is the distribution symmetric?

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

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140) The following table shows average wind speeds (in miles per hour) during 15 major fires in California.

44	55	22	32	29	24	47	33	32	27	58	39	38	51	41

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Outside of Connect, construct a stem-and-leaf diagram. Were most of these storms fueled by 45+ mile-per-hour winds? Explain.

141) The following table shows the prices (in $1,000s) of the last 15 trucks sold at a Toyota dealership.

32	21	26	33	23	24	31	22	17	25	18	23	22	19	35

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Outside of Connect, construct a stem-and-leaf diagram. Given this diagram, estimate the price that a potential buyer would likely pay for a Toyota truck.

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142) The following data represent the ages of patients in the cardiac section of the local hospital. Outside of Connect, construct a stem-and-leaf diagram. Comment on whether or not the distribution is symmetric.

48	53	60	61	62	63	70	70	72	77	78	79	80	82	87	88	90

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Outside of Connect, construct a stem-and-leaf diagram. Comment on whether or not the distribution is symmetric.

143) A high school football league recorded the average points scored per game, as well as the winning percentage, for the 10 teams in the league.

Points per Game	Winning Percentage
24	88%
21	66%
27	78%
13	28%
16	32%
18	52%
15	30%
17	44%
19	32%
22	50%

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Outside of Connect, construct a scatterplot. Does scoring more points appear to be associated with a higher winning percentage?

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144) A statistics instructor computes the grade and percentage of classes that each of his students attends. Outside of Connect, construct a scatterplot from the data displayed next. Does a relationship exist between attendance and grade?

Attendance	47	60	75	86	95	98	100
Grade	58	72	85	84	90	97	92

{MISSING IMAGE}Click here for the Excel Data File</p>

145) A grocery store manager wants to know how the annual demand for wild-caught versus farm-raised salmon changes over time. He has demand data for the two types of salmon from 2010 to 2020:

Year	**Wild-caught ('000 lbs.)**	**Farm-raised ('000 lbs.)**
2010	15.25	18.54
2011	13.63	20.37
2012	18.00	20.25
2013	19.34	20.15
2014	18.71	20.06
2015	25.08	19.98
2016	28.44	17.91
2017	28.70	18.82
2018	30.11	19.70
2019	39.54	17.59
2020	40.06	16.47

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By hand or in Excel, construct a line chart to show the changes in demand over time for the two types of salmon. Which type of salmon has an upward trend in demand?

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146) You want to examine if there is a performance difference between online and traditional students in your Business Statistics class. The data below shows information on a student's grade and whether he/she is an online student:

Student	Online	Grade
1	Yes	A
2	Yes	B
3	No	A
:	:	:
50	Yes	A

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Outside of Connect, construct a contingency table that cross-classifies the data by Online and Grade. How many are online students? How many online students earned an A/B grade? How many traditional students earn an A/B grade? How many online students earned an E grade? How many traditional students earned an E grade?

Outside of Connect, construct a stacked column chart. Does there appear to be a performance gap for online students?

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Answer Key

Test name: Chapter 02

1) FALSE
A frequency distribution for a categorical variable groups these data into categories and records the number of observations that fall into each category, whereas numerical variables are grouped into classes called intervals.

2) TRUE
The relative frequency of each category equals the proportion of observations in each category and is calculated by dividing the frequency by the total number of observations.

3) FALSE
The percent frequency of a category equals the relative frequency of the category multiplied by 100%.

4) FALSE
A pie chart is a segmented circle whose segments portray the relative (or percent) frequency of each category for a categorical variable.

5) TRUE
A bar chart depicts the frequency or the relative frequency for each category as a series of horizontal or vertical bars.

6) TRUE
A bar chart depicts the frequency or the relative frequency for each category as a series of horizontal or vertical bars.

7) TRUE
A contingency table shows the frequencies for two categorical variables, with each cell representing a mutually exclusive combination of the pair of variables' values.

8) FALSE
A stacked column chart is an advanced version of a bar chart designed to visualize more than one categorical variable.

9) FALSE

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This formula is used when we construct a frequency distribution or a histogram for quantitative data. The number of classes typically ranges from 5-20.

10) TRUE
Class relative frequency = Class frequency / Total number of observations.

11) TRUE
A cumulative relative frequency distribution represents the proportion of values that fall below the upper limit of each class.

12) FALSE
A histogram is a series of rectangles where the width and height of each rectangle represent the class width and frequency (or relative frequency) of the class, respectively.

13) TRUE
A polygon is graphical depiction of frequency and relative frequency distributions. It connects a series of neighboring points where each point represents the midpoint of a particular class and its associated frequency or relative frequency.

14) FALSE
An ogive is a graph that plots the cumulative frequency (or the cumulative relative frequency) of each class against the upper limit of the corresponding class.

15) TRUE
A stem-and-leaf diagram is a visual method for displaying quantitative data and gives an idea how data are centered and dispersed from the center. It also maintains the original data values in the chart.

16) TRUE
A scatterplot illustrates whether two numerical variables are related or not.

17) FALSE
When constructing a scatterplot for two numerical variables, we usually refer to one variable as *x* and another one as *y*. Typically, we graph *x* on the horizontal axis and *y* on the vertical axis.

18) FALSE
A pie chart is a segmented circle whose segments portray the relative frequencies of all categories.

19) FALSE

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It depends on the size of the data set. The total number of classes usually ranges from 5 to 20.

20) FALSE
A scatterplot helps to determine whether two numerical variables are related in some systemic way. It can incorporate a categorical variable using a distinct color to show each point's membership to a respective category.

21) D
Frequency distributions may be used to describe all types of data.

22) B
Histograms and stem-and-leaf diagrams describe numerical data. Line charts display numerical data over time.

23) B
The percent frequency is defined as a relative frequency multiplied by 100.

24) C
Only percentage of net sales by product for Lenovo in Year 1 looks at multiple categories of a single qualitative variable, in which the percentage of net sales by product may be meaningfully displayed.

25) B
Five of the 15 customers responded with a rating of Average. Thus, 5/15 = 0.33.

26) C
Five of the customers responded with a rating of Average, while three responded with a rating of Above Average.

27) D
Seventy-four million passengers flew out of Beijing, 64 million passengers flew out of Tokyo, and there is a total of 360 million passengers: (74 + 64)/360 = 38.33%. Wrong answers include the percent frequencies for Tokyo or Beijing individually.

28) C
Eighty-nine million passengers flew out of Atlanta and 66 million passengers flew out of Chicago: 89 − 66 = 23 million.

29) D

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Seven million dollars was spent in total and 13% of the $7 million was spent on mold: $7,000,000 × 0.13 = $910,000.

30) B
Six million dollars was spent in total and 12% of the $6 million was spent on mold: $6,000,000 × 0.12 = $720,000.

31) C
The city spent 22% on termite damage and 6% on water damage. The difference is 16%. The total dollar value spent on the difference is 16% of $6 million—that is, $6,000,000 × 0.16 = $960,000.

32) B
One occurred nine times and the second-most frequent number was 3 with six occurrences.

33) B
Three occurred nine times and the second-most frequent number was 5 with eight occurrences.

34) C
Fifteen of the 30 students, or 50%, gave an evaluation of 4 or 5.

35) C
Six of the 30 students, or 20%, gave an evaluation of 1 or 2.

36) A
Nine of the 30 students gave Professor Smith a 3. The relative frequency is thus 9/30 = 0.3.

37) B
The color corresponding to Julia Child has the largest segment in the pie chart.

38) A
The data are qualitative and the chart is a bar chart.

39) C
The data are qualitative and nominal (no ordering is present in the categories).

40) A
The category is on the vertical axis and the range of values is on the horizontal axis.

41) A

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Check the guidelines for constructing a frequency distribution: classes should be mutually exclusive, exhaustive, and the total number of classes should be between 5 and 20.

42) B
A frequency distribution for qualitative data groups data into categories and records the number of observations in each category.

43) D
Histograms are used to display the relative frequency of a numerical variable. An ogive is used to display the cumulative frequency, while the bar chart and pie chart display qualitative data.

44) C
Class width = (Maximum − Minimum)/(Number of classes) = (90 −23)/5 = 13.40 ≈ 14 (We always round up.)

45) C
Class width = (Maximum − Minimum)/(Number of classes) = (84 −16)/5 = 13.6 ≈ 14 (We always round up.)

46) C

There are four data values that are at least 30 but less than 44. They are 32, 32, 33, and 37.

47) A
There are four data values that are at least 30 but less than 44. They are 32, 32, 33, and 37. So the relative frequency is 4/20 = 0.20.

48) A
Width of class = (maximum value − minimum value)/(Number of classes) Width = (244 − 114)/5 = 26.00; so round up to 26.

49) C
Width of class = (maximum value − minimum value)/(Number of classes) Width = (239 − 115)/5 = 24.8; so round up to 25.

50) B
There are seven data values that are at least 115 but less than 140. They are 115, 122, 125, 127, 135, 139, and 139. So the relative frequency of this class is 7/24.

51) D

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There are seven data values that are at least 165 but less than 190. They are 165, 170, 170, 172, 181, 187, and 188.

52) B
Three students are in the 1,800 up to 2,000 class.

53) C
Twelve students are in the 1,800 up to 2,000 class.

54) D
Twenty-seven of the 30 students, or 90%, scored less than 2,200.

55) B
Seven of the 30 students, or about 0.23, scored between 1,600 and 1,800.

56) A
Ogives are used to display cumulative measures of quantitative data. Polygons are used to display the frequency and relative frequency of quantitative data, while pie charts and bar charts are used to display qualitative data.

57) A
Sum the frequency column to obtain the total number of observations in the frequency distribution, or 38.

58) C
Sum the frequency column to obtain the total number of observations in the frequency distribution, or 20.

59) D
There are six observations in the class 15 up to 18.

60) B
We sum the frequencies in the first three columns: 3 + 6 + 3 = 12.

61) C
Six observations of the 20 total observations fall in the class of 15 up to 18: 6/20 = 0.30.

62) B
We sum the frequencies in the first three columns and then divide by 20: (3 + 6 + 3)/20.

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63) C
Use frequencies shown on the histogram for different number of pages in the book.

64) B
Check the frequency for 200-250 pages interval.

65) C
Add the frequencies, 7, 3, and 1, for the classes 250 up to 300, 300 up to 350, and 350 up to 400.

66) D
Wrong answers include the frequencies in the other classes.

67) D
Wrong answers include the frequencies in the other classes.

68) C
8 + 25 = 33. Wrong answers include the frequencies in preceding class and frequency in relevant class.

69) B
25/50 = 0.50. Wrong answers include the relative frequency in the preceding class and the cumulative relative frequency of the respective class.

70) C
(8 + 25)/50 = 0.66. Wrong answers include the relative frequencies in the preceding class and the respective class.

71) C
277 + 317 + 55 = 649. Wrong answers include the frequency in the respective class, the frequency in the preceding class, and the total number of observations.

72) C
275 + 325 + 50 = 650. Wrong answers include the frequency in the respective class, the frequency in the preceding class, and the total number of observations.

73) B
325/675 = 0.48. Wrong answers include the relative frequency in the preceding class and the cumulative relative frequency of the relevant class.

74) B

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Polygon shows the midpoints of each class and its associated frequency or relative frequency.

75) B
Eighty-Five students scored less than 90, and 37 students scored less than 70. The total that scored at least 70 but less than 90 equals the number that scored less than 90 minus the number that scored less than 70: 85 − 37 = 48.

76) C
Eighty-eight students scored less than 90, and 33 students scored less than 70. The total that scored at least 70 but less than 90 equals the number that scored less than 90 minus the number that scored less than 70: 88 −33 = 55.

77) D
Sum the frequency of the intervals 200 up to 300, 300 up to 400, and so on, and divide by the total of 26: (8 + 7 + 5 + 1)/26 = 21/26 ≈ 0.81, or 81%.

78) C
0.08(100) = 8 employees

79) B

0.07(100) = 7 employees

80) D
(0.15 + 0.31)100 = 46 employees.

81) D
(0.22 + 0.25)100 = 47 employees.

82) B
An ogive shows cumulative frequency or cumulative relative frequency.

83) D
An ogive is used to show cumulative frequencies and polygon is graphical depiction of just a frequency.

84) C
Draw a vertical line from the tick mark for 600 on the *x* axis; this crosses the ogive at approximately 0.8.

85) C

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Draw a vertical line from about 500 on the *x* axis; this crosses the ogive at approximately 0.4. So about 40% of the houses sold for less than $500,000, which implies that about 60% sold for more than $500,000.

86) D
Draw a vertical line from the approximate location for 90 on the *x* axis; this crosses the ogive at approximately 0.75.

87) B
Draw a vertical line from the approximate location for 70 on the *x* axis; this crosses the ogive at approximately 0.45, so about 45% of the Girl Scouts sold fewer than 70 boxes, which implies that about 55% of the Girl Scouts sold more than 70 boxes.

88) D
Stem in the stem-and-leaf diagrams consists of the leftmost digits. Leaf consists of the last digit(s).

89) A
Stem in the stem-and-leaf diagrams consists of the leftmost digits, and the leaf consists of the last digit(s).

90) C
Stem in the stem-and-leaf diagrams consists of the leftmost digits, and the leaf consists of the last digit(s).

91) D
The observations in this class would be 38, 42, and 42.

92) B
These values are 25, 26, 26, 28, 28, 28, 29, 30, 31, 32, and 32.

93) A
These values are 29, 30, 31, 32, 32, 38, 42, and 42.

94) B
A stem-and-leaf diagram is basically a histogram on its side. When turned, it reveals a distribution with a few extreme values to the right. Thus, it is positively skewed.

95) B

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28, 29, 30, 34, 37, 37, and 39.

96) B
26, 26, 27, 29, 34, 37, 37, 38, and 39.

97) C
Procter and Gamble paid dividend payments of 0.44 five times.

98) D
All of the relationships mentioned may be seen in a scatterplot. The relationships can also be categorized as positive or negative. Causality is determined based on the experimental design and not on the relationship of the line.

99) D
When looking at the plotted points, the variables have a positive relationship (*y* tends to increase as *x* increases), and the relationship appears linear or slightly curvilinear.

100) B
When looking at the plotted points, the variables have a negative relationship (*y* tends to decrease as *x* increases), and the relationship appears linear or possible curvilinear.

101) C
As *x* increases, *y* decreases. Therefore, the data have a negative relationship.

102) B
As *x* increases, *y* increases. Therefore, the data have a positive relationship. Even though the point (9,20) is not in line with the rest of the points, overall it shows an increasing positive relationship.

103) A
The graph shows that the higher the MSRP, the higher the profit margin.

104) D
A frequency distribution for qualitative data groups data into categories and records the number of observations that fall into each category. Bars 3, 4, & 5 gives you 22 + 13 + 8 = 43.

105) C
A pie chart is the best to display these data – it shows segments that portray the relative frequencies presented as percentages.

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106) C
If we sum the frequency column, we obtain the sample size.

107) B
If we sum the frequency column, we obtain the sample size.

108) C
In this case, ({{[a(6)]:#,###}} + {{[a(7)]:#,###}} + {{[a(8)]:#,###}} + {{[a(9)]:#,###}}) / ({{[a(6)]:#,###}} + {{[a(7)]:#,###}} + {{[a(8)]:#,###}} + {{[a(9)]:#,###}} + {{[a(10)]:#,###}}) = {{[a(12)]:#,###}}/{{[a(11)]:#,###}} = {{[a(14)]:#,###.00}}%.

For quantitative data, a relative frequency distribution identifies the proportion of observations that falls into each class: class relative frequency is equal to the class frequency divided by total number of observations.
5 / (5 + 11 + 9 + 7 + 10) = 5 / 42 = 11.9%

109) B
In this case, 12 / (12 + 9 + 17 + 11 + 6) = 12/55 = 21.8%

For quantitative data, a relative frequency distribution identifies the proportion of observations that falls into each class: class relative frequency is equal to the class frequency divided by total number of observations.

12 / (12 + 9 + 17 + 11 + 6) = 12 / 55 = 21.8%

110) C
In this case, (12 + 9 + 17 + 11) / (12 + 9 + 17 + 11 + 6) = 49/55 = 89.1%

For quantitative data, a relative frequency distribution identifies the proportion of observations that falls into each class: class relative frequency is equal to the class frequency divided by total number of observations.

(12 + 9 + 17 + 11) / (12 + 9 + 17 + 11 + 6) = 49 / 55 = 89.1%

111) A
In this case, 1026 × (0.30 + 0.11) = 420.66

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The percent frequency is the percent of observations in a category. To get a frequency the percent frequency should be multiplied by the number of observations. (30% + 11%) * 1026 = 421

112) B
For quantitative data, a relative frequency distribution identifies the proportion of observations that falls into each class: class relative frequency is equal to the class frequency divided by total number of observations. In this case, the 1,000 up to 1,750 class is made up of three classes (5+6+10 = 21), which is greater than any other answer choice class.

113) B
In this case, (7237 + 8372)/(sum of all regions) = 15609/37276 = 41.87%

The percent frequency is the percent of observations in a category (or categories), and it equals the frequency divided by the total number of observations and multiplied by 100. (7237 + 8372) / 37276 = 41.87%

114) C
A stem-and-leaf diagram is constructed by separating each value of dataset into two parts: a stem, which consists of the leftmost digits, and a leaf, which consists of the last digit(s).

115) D
A stem-and-leaf diagram is constructed by separating each value of data set into two parts: a stem, which consists of the leftmost digits, and a leaf, which consists of the last digit(s).

116) C
A stacked column chart is a graphical method to summarize the relationship between two categorical variables.

117) A
A contingency table by Gender and Position Level will show whether certain position levels have more males than females.

118) D
A bar chart is used to display categorical data.

119) [categories, observations]
For qualitative data, a frequency distribution groups data into categories and records the number of observations that fall into each category.

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120) frequency distribution
Graphically, we can show a frequency distribution for qualitative data by constructing a pie chart or a bar chart.

121) [exclusive, exhaustive]
Each group for quantitative data may not overlap another group (mutually exclusive) and every observation has to fit into one of the groups (exhaustive).

122) frequency distribution
Check the guidelines for constructing frequency distribution.

123) [symmetric, skewed]
124) histogram
Like histograms, stem-and-leaf diagrams give an overall picture of where the data are centered, how data are dispersed, and the overall shape of the data.

125) curvilinear
A positive curvilinear relationship exists between variables *x* and *y*, when *y* tends to increase in increasing rate as *x* increases.

126) positive
A positive linear relationship exists between variables *x* and *y*, when *y* tends to increase as *x* increases.

127) unemployed
For those who have High School as their highest level of education, 7 are unemployed and 5 are employed. Therefore, most of the unemployed have a High School highest education.

128) [males, females]
The Masters column has a higher portion of males than females.

129) Short Answer

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a. See the table below for the frequency distribution. Forty people designated that the computer and mathematical field was their job interest.

Field	Relative Frequency	Frequency
Management	0.15	60
Business and financial operations	0.20	80
Computer and mathematical	0.10	40
Life, physical, and social science	0.30	120
Community and social service	0.25	100

b.

[MISSING IMAGE: A pie chart shows the survey of 400 unemployed people. Management: 15%. Business and financial operations: 20%. Computer and mathematical: 10%. Life, physical and social science: 30%. Community and social service: 25%., A pie chart shows the survey of 400 unemployed people. Management: 15%. Business and financial operations: 20%. Computer and mathematical: 10%. Life, physical and social science: 30%. Community and social service: 25%.]

In order to construct the frequency distribution, multiply each relative frequency by 400, the sample size. For the pie chart, each segment corresponds to the relative frequency for each job category.

130) Short Answer

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a.

Hair Color	Frequency	Relative Frequency
Black	6	0.24
Blonde	8	0.32
Brown	5	0.20
Red	6	0.24

b. The most common hair color is Blonde.

[MISSING IMAGE: A pie chart shows the record of hair color. Red: 24%. Blonde: 32%. Brown: 20%. Black: 24%., A pie chart shows the record of hair color. Red: 24%. Blonde: 32%. Brown: 20%. Black: 24%.]

c. Six customers have black hair.

[MISSING IMAGE: A pie chart records the hair color of customers. Red: 6. Blonde: 8. Brown: 5. Black: 6., A pie chart records the hair color of customers. Red: 6. Blonde: 8. Brown: 5. Black: 6.]

To construct a pie chart in Excel, select both columns of data, and then select **Insert > Pie > 2-D Pie**. Choose the option at the top left. To construct a bar chart in Excel, select both columns of data, and then select **Insert > Column > 2-D Column**. Choose the option at the top left. See instructions in text for other formatting options.

131) Short Answer
Twenty-three percent of the containers traveled through Hong Kong.

[MISSING IMAGE: A pie chart shows the number of containers in millions. Shanghai: 28%. Singapore: 27%. Hong Kong: 23%. Rotterdam: 10%. Los Angeles: 7%. New York: 5%., A pie chart shows the number of containers in millions. Shanghai: 28%. Singapore: 27%. Hong Kong: 23%. Rotterdam: 10%. Los Angeles: 7%. New York: 5%.]

To construct a pie chart in Excel, select both columns of data, and then select **Insert > Pie > 2-D Pie**. Choose the option at the top left. See instructions in the text for other formatting options. Twenty-four million out of 104 million containers went through Hong Kong: 24/104 = 23%.

132) Short Answer

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Consumer staples companies tend to have stable stocks. No, the graph does not accurately depict the volatility of JNJ stock. The vertical axis starts at 54 and should start at zero.

The scale on the vertical axis should begin at zero. Refer to Figure 2.4, where graphs with misleading scales are shown.

133) Short Answer

a. 0.095.

b. 0.348.

Age	Frequency	Relative Frequency	Cumulative Relative Frequency
16 to 19	4,794	0.034	0.034
20 to 24	13,273	0.095	0.129
25 to 34	30,789	0.219	0.348
35 to 44	30,021	0.214	0.562
45 to 54	32,798	0.234	0.796
55 and over	28,660	0.204	1.000

c.

[MISSING IMAGE: A histogram plots relative frequency versus age of unemployed worker. The horizontal axis is labeled age of unemployed worker. It is marked from left to right as follows: 16 to 19, 20 to 24, 25 to 34, 35 to 44, 45 to 54, and 55 and over. The vertical axis is labeled relative frequency. It ranges from 0 to 0.25 in increments of 0.05. 16 to 19: 0.04. 20 to 24: 0.09. 25 to 34: 0.23. 35 to 44: 0.22. 45 to 54: 0.24. 55 and over: 0.19., A histogram plots relative frequency versus age of unemployed worker. The horizontal axis is labeled age of unemployed worker. It is marked from left to right as follows: 16 to 19, 20 to 24, 25 to 34, 35 to 44, 45 to 54, and 55 and over. The vertical axis is labeled relative frequency. It ranges from 0 to 0.25 in increments of 0.05. 16 to 19: 0.04. 20 to 24: 0.09. 25 to 34: 0.23. 35 to 44: 0.22. 45 to 54: 0.24. 55 and over: 0.19.]

First find the total number of people surveyed by summing the frequency column (n = 140,335).
a. To find the relative frequency for each class, divide each class's frequency by n; so the proportion of workers that are between 20 and 24 years old is 13,273/140,335 = 0.095.
b. To find the cumulative relative frequency for each class, take each class's relative frequency and add it to the preceding relative frequencies. So the proportion of workers that are younger than 35 years old is 0.034 + 0.095 + 0.219 = 0.348.
c. To construct a relative frequency histogram by hand, let the width of each rectangle equal the width of the class, and its height equal the corresponding relative frequency. In order to construct a relative frequency histogram in Excel, put the class column and the relative frequency column next to one another in the spreadsheet. Select both columns simultaneously and then choose **Insert > Column > 2-D Column.** Choose the option at the top left. See instructions in the text for other formatting options.

134) Short Answer

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a.

Batting Average	Frequency	Relative Frequency	Cumulative Relative Frequency
0.265 – 0.280	12	0.300	0.300
0.280 – 0.295	10	0.250	0.550
0.295 – 0.310	13	0.325	0.875
0.310 – 0.325	1	0.025	0.900
0.325 – 0.340	3	0.075	0.975
0.340 – 0.355	1	0.025	1.000

b. One player has a batting average above 0.340; 25% of the players have a batting average of at least 0.280 but less than 0.295; 90% of the players have batting averages below 0.325.
c. The distribution is not symmetric; it is positively skewed.

[MISSING IMAGE: A histogram plots relative frequency versus batting average. The horizontal axis is labeled batting average. It is labeled from left to right as follows: .265 to .280, .280 to .295, .295 to .310, .310 to .325, .325 to 340, and .340 to .355. The vertical axis is labeled relative frequency. It ranges from 0 to 14 in increments of 2. .265 to .280: 12. .280 to .295: 10. .295 to .310: 13. .310 to .325: 1. .325 to .340: 3. .340 to .355: 0.8., A histogram plots relative frequency versus batting average. The horizontal axis is labeled batting average. It is labeled from left to right as follows: .265 to .280, .280 to .295, .295 to .310, .310 to .325, .325 to 340, and .340 to .355. The vertical axis is labeled relative frequency. It ranges from 0 to 14 in increments of 2. .265 to .280: 12. .280 to .295: 10. .295 to .310: 13. .310 to .325: 1. .325 to .340: 3. .340 to .355: 0.8.]

d.

[MISSING IMAGE: A graph plots cumulative relative frequency versus batting average. The graph shows a curve that begins at the bottom left, goes up and to the right with increasing steepness until a point, and then continues to go up and to the right with decreasing steepness., A graph plots cumulative relative frequency versus batting average. The graph shows a curve that begins at the bottom left, goes up and to the right with increasing steepness until a point, and then continues to go up and to the right with decreasing steepness.]

e. Approximately 0.55

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a. To construct the frequency distribution, count the number of players whose batting average falls in each class. To construct a relative frequency distribution, divide the frequency of each class by the total number of observations (in this case, 40). To construct the cumulative relative frequency distribution, take the relative distribution and add it to the preceding class's cumulative relative frequency. For the lowest class, the cumulative relative frequency is simply the relative frequency of that class.
b. Use the distributions computed in part a. to answer these questions.
c. Because the distribution has a tail toward the right, we are able to say that it is positively skewed. To construct a relative frequency histogram by hand, let the width of each rectangle equal the width of the class, and its height equal the corresponding relative frequency. To construct a relative frequency histogram in Excel, put the class column and the relative frequency column next to one another in the spreadsheet. Select both columns simultaneously and then choose **Insert > Column > 2-D Column**. Choose the option at the top left. See instructions in the text for other formatting options.
d. To construct an ogive in Excel, create a table with two columns. In the left column, put the upper limit of each class, and in the right column put the cumulative relative frequency or cumulative percent frequency. In the first row of this table, insert the lower bound of the first class in the left column and a 0 in the right column. Select both columns simultaneously and then choose **Insert > Scatter** and pick the option given at the top right (a scatterplot with a smooth line connecting the points).

Draw a vertical line up from 0.290 on the horizontal axis of the ogive. This intersects the ogive at about 0.45, so about 45% of this group of players have a batting average less than 0.290. Therefore, about 55% have a batting average greater than 0.290.

135) Short Answer
b. 23/30 ≈ 0.77 or about 77%. See cumulative relative frequency distribution in part a.
c. 15/30 = 0.5 or 50%. See cumulative relative frequency distribution in part a.

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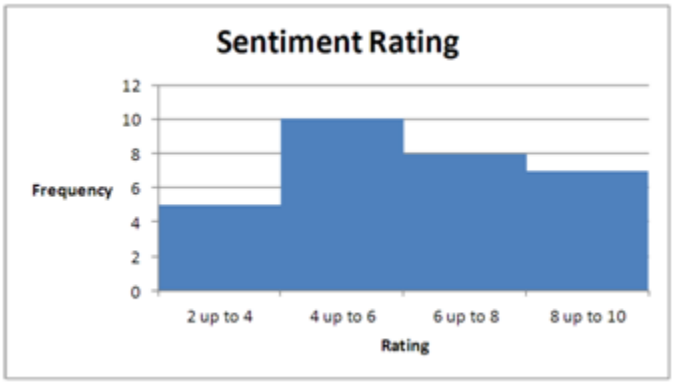
a.

Sentiment Rating	Frequency	Relative Frequency	Cumulative Frequency	Cumulative Relative Frequency
2 up to 4	5	0.1667	5	0.1667
4 up to 6	10	0.3333	15	0.5000
6 up to 8	8	0.2667	23	0.7667
8 up to 10	7	0.2333	30	1.0000
Total	30	1.000		

b.



about 77%.

c. 50%.

136) Short Answer

Business Statistics Communicating with Numbers Edition 4 by Jaggia

a. 0.35
b. 5

Class	Cumulative Relative Frequency	Relative Frequency	Frequency
51 - 60	0.05	0.05	1
61 - 70	0.20	0.15	3
71 - 80	0.45	0.25	5
81 - 90	0.80	0.35	7
91 - 100	1.00	0.20	4

c. Approximately 60% of students scored less than 85.

[MISSING IMAGE: A graph plots relative frequency versus scores. The horizontal axis is labeled scores. It ranges from 0 to 120 in increments of 20. The vertical axis is labeled relative frequency. It ranges from 0 to 1 in increments of 0.1. The graph shows a curve that begins at (50, 0), passes through (60, 0.05), (70, 0.2), (80, 0.5), (90, 0.8), and ends at (100, 1)., A graph plots relative frequency versus scores. The horizontal axis is labeled scores. It ranges from 0 to 120 in increments of 20. The vertical axis is labeled relative frequency. It ranges from 0 to 1 in increments of 0.1. The graph shows a curve that begins at (50, 0), passes through (60, 0.05), (70, 0.2), (80, 0.5), (90, 0.8), and ends at (100, 1).]

a. To find the relative frequency for each class, subtract each class's cumulative relative frequency from the preceding cumulative relative frequency; so the proportion of students that scored between 81 and 90 is 0.80 − 0.45 = 0.35.
b. To find the frequency for each class, multiply each class's relative frequency by N (N = 20); so the number of students that scored between 71 and 80 is 0.25 × 20 = 5.
c. To construct an ogive, we plot the five points corresponding to the upper class limits and their cumulative relative frequencies. In addition, we add one point being the first class lower limit with a zero value. See instructions in the text for plotting an ogive in Excel. We then draw a vertical line at the score 85 (not shown) until it intersects the curve. At the intersection, draw a horizontal line to the y axis—it intersects at approximately 0.60, or 60%.

137) Short Answer

Business Statistics Communicating with Numbers Edition 4 by Jaggia

[MISSING IMAGE: A graph plots relative frequency versus dividend yield. The horizontal axis is labeled dividend yield. It ranges from 0 to 0.1 in increments of 0.02. The vertical axis is labeled relative frequency. It ranges from 0 to 1 in increments of 0.1. The graph shows a curve that begins at (0, 0), passes through (0.02, 0.55), (0.04, 0.85), (0.06, 0.9), (0.08, 0.95), and ends at (0.1, 1)., A graph plots relative frequency versus dividend yield. The horizontal axis is labeled dividend yield. It ranges from 0 to 0.1 in increments of 0.02. The vertical axis is labeled relative frequency. It ranges from 0 to 1 in increments of 0.1. The graph shows a curve that begins at (0, 0), passes through (0.02, 0.55), (0.04, 0.85), (0.06, 0.9), (0.08, 0.95), and ends at (0.1, 1).]

Approximately 30% of the stocks had a dividend yield of 3% or greater.

To construct an ogive, we plot the five points corresponding to the upper class limits and their cumulative relative frequencies. In addition, we add one point being the first class lower limit with a zero value. See instructions in the text for plotting an ogive in Excel. We then draw a vertical line at the score .03 (not shown) until it intersects the curve. At the intersection, draw a horizontal line to the *y* axis—it intersects at approximately 0.70. One minus 0.7 equals 0.3, which is the approximate proportion with dividend yields of 3% or more.

138) Short Answer
No, the distribution is positively skewed.

Sort the data from lowest value to highest value, grouping by the leftmost digit. Write the leftmost digit in the left-hand column. In the right column, write the rightmost digit of each data point, separated by a space, in ascending order. By turning the stem-and-leaf diagram on its side, we notice that the distribution has a tail toward the right. The distribution is therefore positively skewed.

139) Short Answer
No, the distribution is negatively skewed.

Sort the data from lowest value to highest value, grouping by the leftmost digit. Write the leftmost digit in the left-hand column. In the right column, write the rightmost digit of each data point, separated by a space, in ascending order. By turning the stem-and-leaf diagram on its side, we notice that the distribution has a tail toward the left. The distribution is therefore negatively skewed.

140) Short Answer

Business Statistics Communicating with Numbers Edition 4 by Jaggia

No, most of the time the average wind speed was below 45 mph; only 4 out of the 15 storms had average wind speeds exceeding 45 mph.

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

- Sort data, then group according to the 10s digit.

20s	22, 24, 27, 29
30s	32, 32, 33, 38, 39
40s	41, 44, 47
50s	51, 55, 58

- Write the 10s digits in the left-hand column.
- Draw a line next to the 10s digit.

On the right-hand side of the line, write the 1s digit for each number.

141) Short Answer

A potential buyer of a Toyota truck is likely to pay in the low to mid $20s (in thousands).

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

- Sort data, then group according to the 10s digit.

10s	17, 18, 19
20s	21, 22, 22, 23, 23, 24, 25, 26
30s	31, 32, 33, 34

- Write the 10s digits in the left-hand column.
- Draw a line next to the 10s digit.

On the right-hand side of the line, write the 1s digit for each number.

142) Short Answer

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

The distribution is not symmetric; it is slightly negatively skewed due to patient who is 48 years old.

40s	48
50s	53
60s	60, 61, 62, 63
70s	70, 70, 72, 77, 78, 79
80s	80, 82, 87, 88
90s	90

Because the numbers are already sorted, begin by grouping according to the 10s digit. Write the 10s digits in the left-hand column. Draw a line next to the 10s digit. On the right-hand side of the line, write the 1s digit for each number.

143) Short Answer
Teams with higher points per game tend to have a higher winning percentage.

[MISSING IMAGE: A scatter plot shows winning percentage versus average points per game. The horizontal axis is labeled average points per game. It ranges from 0 to 30 in increments of 5. The vertical axis is labeled winning percentage. It ranges from 0% to 100% in increments of 10%. The relationship between winning percentage and average points per game is positive and linear., A scatter plot shows winning percentage versus average points per game. The horizontal axis is labeled average points per game. It ranges from 0 to 30 in increments of 5. The vertical axis is labeled winning percentage. It ranges from 0% to 100% in increments of 10%. The relationship between winning percentage and average points per game is positive and linear.]

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To construct the scatterplot, plot each team's points per game-winning percentage combination, where, in our answer key, the points per game correspond to the value on the horizontal axis, and the winning percentage corresponds to the value on the vertical axis. Since the relationship is clearly positive (as one variable gets larger, the other tends to get larger as well), teams that score more points tend to have a higher winning percentage.

144) Short Answer

[MISSING IMAGE: A scatter plot shows grade out of 100 versus attendance in percentage of classes attended. The horizontal axis is labeled attendance in percentage of classes attended. It ranges from 0 to 100 in increments of 20. The vertical axis is labeled grade out of 100. It ranges from 0 to 100 in increments of 20. The relationship between grade out of 100 and attendance is positive and linear., A scatter plot shows grade out of 100 versus attendance in percentage of classes attended. The horizontal axis is labeled attendance in percentage of classes attended. It ranges from 0 to 100 in increments of 20. The vertical axis is labeled grade out of 100. It ranges from 0 to 100 in increments of 20. The relationship between grade out of 100 and attendance is positive and linear.]

Yes, there appears to be a positive relationship.

To construct the scatterplot, plot each attendance-grade combination, where, in our answer key, the attendance corresponds to the value on the horizontal axis and the grade corresponds to the value on the vertical axis. Since a clear positive relationship exists, we are able to say that the two variables are related.

145) Short Answer

The wild-caught salmon has an upward trend in demand.

To construct the line chart in Excel, select the cells that contain the entire data set. From the menu, select Insert > Chart > Line. Add/edit the chart element as needed. The line for wild-caught salmon shows an upward trend as opposed to the downward trend for the farm-raised salmon.

146) Short Answer

Business Statistics Communicating with Numbers Edition 4 by Jaggia

Grade	Online-No	Online-Yes	Grand Total
A	11	7	18
B	8	4	12
C	4	5	9
D	4	3	7
E	1	3	4
Grand Total	28	22	50

There are 22 online students; 11 online students earn an A/B grade; 19 traditional students earn an A/B grade; 3 online student earned an E grade; 1 traditional students earned an E grade.

[MISSING IMAGE: A stacked bar graph shows the count of students attending online classes. Grade A. Online, yes: 11. Online, no: 7. Grade B. Online, yes: 7. Online, no: 5. Grade C. Online, yes: 4. Online, no: 5. Grade D. Online, yes: 4. Online, no: 3. Grade E. Online, yes: 1. Online, no: 3., A stacked bar graph shows the count of students attending online classes. Grade A. Online, yes: 11. Online, no: 7. Grade B. Online, yes: 7. Online, no: 5. Grade C. Online, yes: 4. Online, no: 5. Grade D. Online, yes: 4. Online, no: 3. Grade E. Online, yes: 1. Online, no: 3.]

[MISSING IMAGE: A stacked bar graph shows the count of students attending online classes. Grade A. Online, yes: 2. Online, no: 3. Grade B. Online, yes: 2. Online, no: 1. Grade C. Online, yes: 2. Online, no: 1. Grade D. Online, yes: 1., A stacked bar graph shows the count of students attending online classes. Grade A. Online, yes: 2. Online, no: 3. Grade B. Online, yes: 2. Online, no: 1. Grade C. Online, yes: 2. Online, no: 1. Grade D. Online, yes: 1.]

There appears to be a performance gap for online students. There are fewer A/Bs and more Es for online students as opposed to traditional students.

To construct the contingency table in Excel, select the cells that contain the entire data set. From the menu, select Insert > Pivot table. Drag the grade variable to the Row field, the online variable to the Column field, and the student variable to the Values field within the PivotTable Fields screen. Edit the table elements as needed. The resulting table shows the number of students by online and grade.

To construct the stacked column chart in Excel, select the cells that contain the data of the contingency table. From the menu, select Insert > Insert Column or Bar Chart > Stacked Column. Add/Edit the chart elements as needed. The resulting chart is a visual representation of the contingency table.