Essentials of Business Statistics 3rd edition Jaggia Test Bank

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Essentials of Business Statistics Edition 3 by Jaggia

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 the observations into classes called intervals and records the total number of observations in each class.
   - ◎ true
   - ◎ false

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

3) For a categorical variable, 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 its relative size for a numerical variable.
   - ◎ true
   - ◎ false

5) A bar chart depicts the frequency or the relative frequency of each category of the categorical variable as a series of bars rising vertically from the horizontal axis or extending 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

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 the 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 interval.
   - ◎ true
   - ◎ false

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

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

13) 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

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

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

16) The intervals (classes) in a histogram are equally wide and do not overlap.
- ◎ true
- ◎ false

17) A histogram is said to be symmetric if, when we draw a vertical line down its center, the two sides are nearly identical in shape and size.
- ◎ true
- ◎ false

18) The original observations in numerical data can be determined after they are grouped in a frequency distribution.
- ◎ true
- ◎ false

19) A scatterplot is a graphical tool that helps in determining whether or not two numerical variables are related in some systematic way.
- ◎ true
- ◎ false

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

20) 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

21) In order to summarize a categorical variable, a useful tool is to develop a _____.
- A) histogram
- B) frequency distribution
- C) contingency table
- D) line chart

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22) 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.

23) 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 a specific year
D) Growth rates of firms in a particular industry

24) 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 _____ .

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

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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 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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26) The following is a list of five of the world's busiest airports by passenger traffic for a specific year.

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 world's busiest airports that occurred in Asia is the closest to _____.

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

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

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

28) 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	20%
Water Damage	5%
Mold	10%
Earthquake	30%
Other	35%

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

A) $1,200,000
B) $600,000
C) $300,000
D) $1,800,000

29) A city in California spent $6 million repairing damage to its public buildings in a specific year. 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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30) A city in California spent $6 million repairing damage to its public buildings in a specific year. 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

31) 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	3	4	1	3	4	2	5	3
2	3	4	5	3	3	1	1	4	2
3	2	3	2	1	3	4	3	1	3

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What is the most common score given in the evaluations?

A) 4
B) 3
C) 5
D) 1

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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:

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

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

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

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 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%

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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

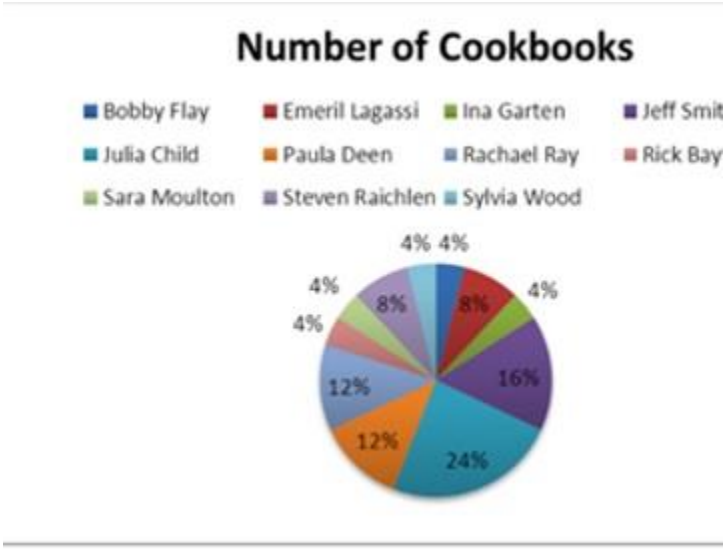
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What is the relative frequency of the students who gave Professor Smith an evaluation of 3?

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

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36) 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

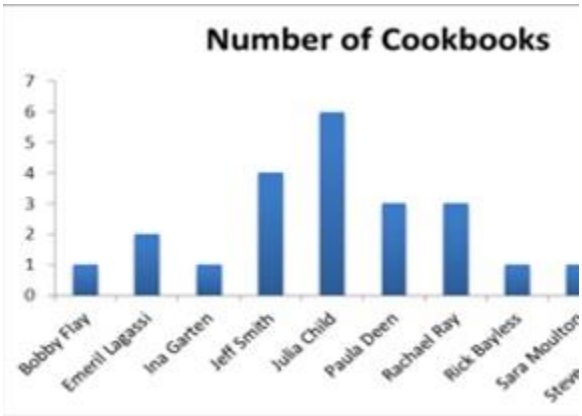
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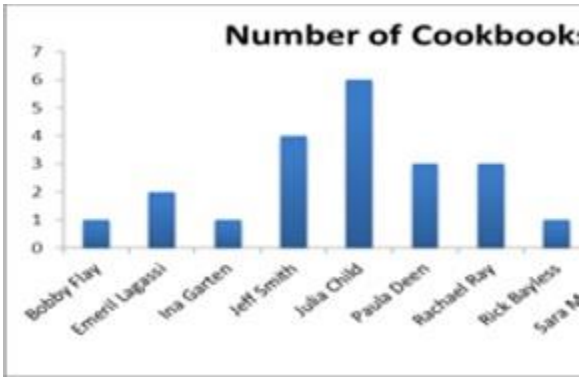
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37) The accompanying chart shows the numbers of books written by each author in a collection of cookbooks. What type of chart is this?



A) Bar chart for categorical data
B) Bar chart for numerical data
C) Frequency histogram for categorical data
D) Frequency histogram for numerical data

38) 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) numerical, ordinal
B) numerical, ratio
C) categorical, nominal
D) categorical, ordinal

39) 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

40) When constructing a frequency distribution for a numerical variable, it is important to remember that_____.

A) intervals are mutually exclusive and exhaustive
B) intervals are overlapping
C) the total number of intervals cannot exceed 15
D) the total number of intervals should be at least 40

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41) 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.

42) What graphical tool is *best* used to display the relative frequency of a numerical variable?
A) Contingency table
B) Pie chart
C) Bar chart
D) Histogram

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

35	77	84	72	70	47	44	66	28	92
56	63	79	27	16	63	46	36	27	32

Click here for the Excel Data File
Suppose the data on quiz scores will be grouped into five intervals. The width of the intervals for a frequency distribution or histogram is the closest to _____blan.
A) 18
B) 12
C) 16
D) 14

44) 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 intervals. The width of the intervals for a frequency distribution or histogram is the closest to _____.
A) 10
B) 12
C) 14
D) 16

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

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

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 intervals, and one of them will be "30 up to 44"—that is, $\{x; 30 \le x < 44\}$. The relative frequency of this interval is _____.

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

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

202	118	138	169	216	125	195	229
251	109	231	219	203	158	111	169
148	152	168	269	127	228	148	233

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

A) 32
B) 37
C) 22
D) 27

48) 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 intervals. The width of the intervals for a frequency distribution or histogram is the closest to _____.

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

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

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

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 intervals, and one of them will be "165 up to 190"—that is, $\{x; 165 \le x < 190\}$. The frequency of this class is _____.

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

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

1,610	1,820	1,910	2,230	2,020	1,650	2,220	1,990	2,170	1,450
1,820	1,680	1,930	1,440	1,840	1,780	1,930	2,080	1,740	2,030
2,080	1,660	1,950	1,960	1,990	1,440	2,020	2,360	2,110	2,030

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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) 10
C) 6
D) 3

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52) 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

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

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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

55) 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 _____blank.

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

56) 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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57) 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

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

How many observations are less than 21?

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

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

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

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

What proportion of the observations are less than 21?

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

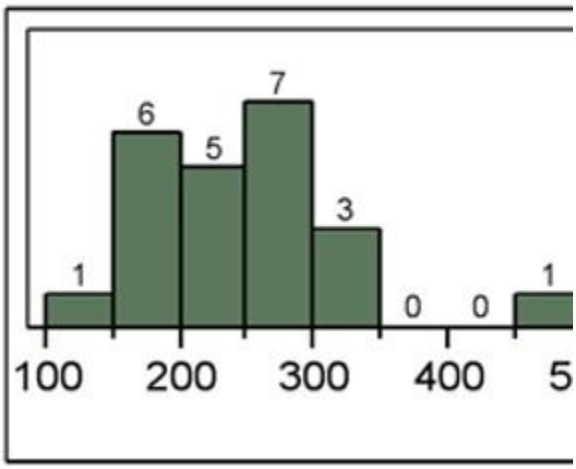
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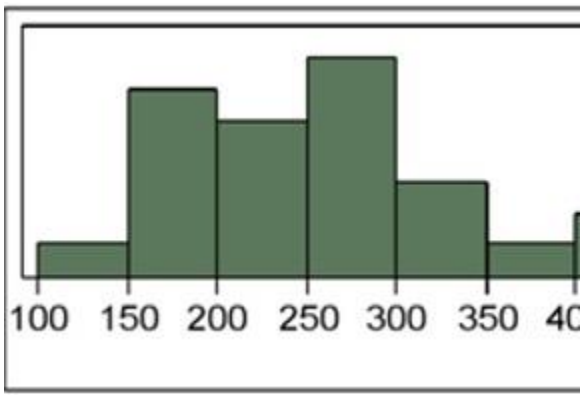
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61) The following histogram represents the number of pages in each book within a collection. What is the frequency of books containing at least 250 but fewer than 300 pages?



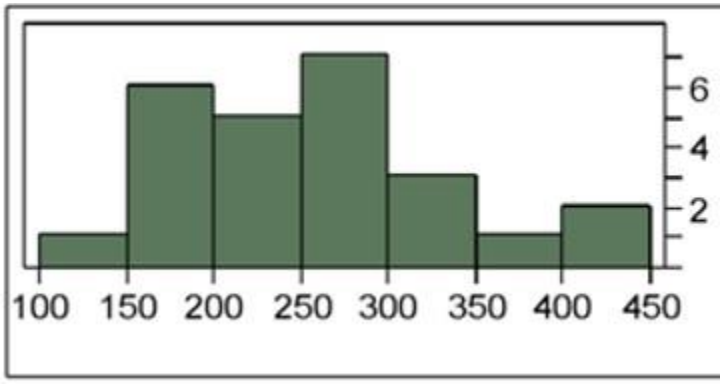
A) 5
B) 6
C) 7
D) 12

62) 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

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 400 pages?



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

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

Class (in percent)	Frequency
-10 up to 0	11
0 up to 10	23
10 up to 20	19
20 up to 30	6

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

A) 11
B) 23
C) 6
D) 19

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65) 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

66) 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

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

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

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

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

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69) 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	52
55 up to 65	317
65 up to 75	272
75 up to 85	19

How many cars travelled less than 75 miles per hour?

A) 316
B) 666
C) 641
D) 266

70) 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 cars travelled less than 75 miles per hour?

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

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	50
55 up to 65	325
65 up to 75	275
75 up to 85	25

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

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

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

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Scores	Cumulative Frequency
50 up to 60	17
60 up to 70	31
70 up to 80	62
80 up to 90	87
90 up to 100	100

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

A) 89
B) 56
C) 25
D) 32

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73) 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

74) 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%

75) 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	0.13
55 up to 65	0.33
65 up to 75	0.15
75 up to 85	0.32

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) 10
C) 15
D) 7

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76) 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

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77) 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

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	0.07
45 up to 55	0.15
55 up to 65	0.31
65 up to 75	0.22
75 up to 85	0.25

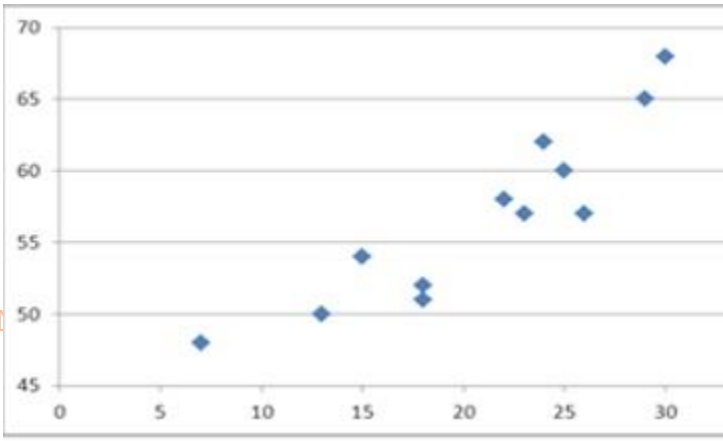
If Kelly's employs 100 salespeople, how many of these salespeople have sold at least 65 cars in the last year?

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

79) 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

80) What type of relationship is indicated in the scatterplot shown below?



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

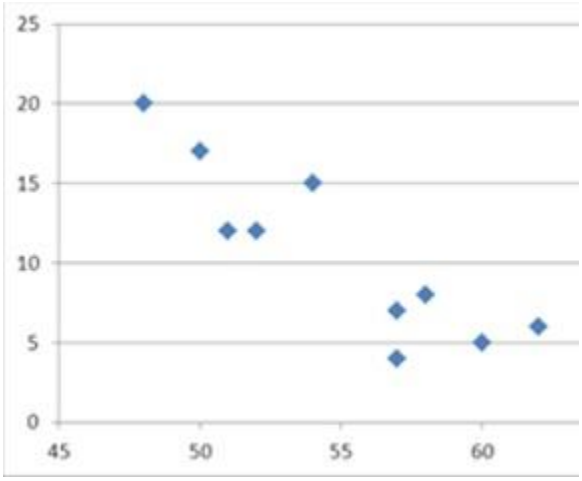
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81) What type of relationship is indicated in the scatterplot shown below?



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

82) 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 curvilinear relationship
C) A negative linear relationship
D) There is not enough information to answer the question

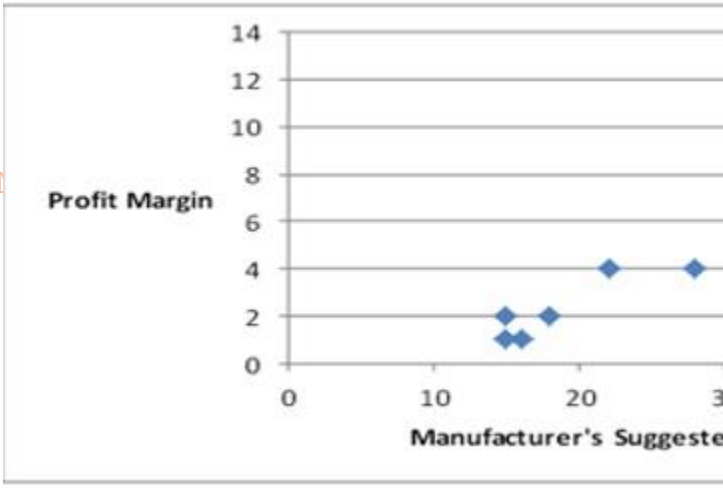
83) Use the following data to construct a scatterplot. What type of relationship is implied?

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) The is not enough information to answer the question

84) 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 (MSRP) increases, the profit margin tends to _____.

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

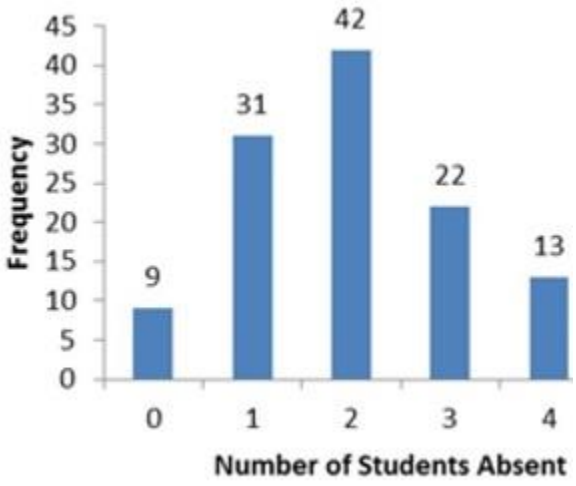
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85) A statistics professor has kept attendance records and recorded the number of absent students per class. The recorded data is displayed in the following bar chart with the number of statistics classes shown above the bars.



How many statistics classes had three or more students absent?

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

86) 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

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

Number Sold	Frequency
01-05	8
06-10	11
11-15	13
16-20	16
21-25	4

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

A) 77
B) 52
C) 27
D) 104

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88) 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

89) 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	10
$400 up to $450	7
$450 up to $500	9
$500 up to $550	6
$550 up to $600	13

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

A) 33.7%
B) 16.8%
C) 31.3%
D) 22.2%

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90) 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%

91) 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%

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92) 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

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93) 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%

94) 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

95) 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.

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

A) line chart
B) histogram
C) scatterplot
D) bar chart

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97) Which of the following statements about shapes of histograms is true?
A) A histogram is said to be symmetric if, when we draw a vertical line down its center, the two sides are identical in shape and size.
B) A histogram is said to be positively skewed if it has a long tail extending to the right.
C) A histogram is said to be negatively skewed if it has a long tail extending to the left.
D) All these choices are true.

98) What values are displayed on a cumulative relative frequency distribution?
A) The number of observations that falls into each class
B) The proportion (fraction) of observations that falls into each class
C) The number of observations that falls below the upper limit of each class
D) The proportion (fraction) of observations that falls below the upper limit of each class

99) The largest value in a numerical data is 180, and the smallest value is 80. If the resulting frequency distribution is to have five classes of equal width, what will be the class width?
A) 100
B) 5
C) 20
D) 4

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

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

101) When constructing a frequency distribution for a numerical variable, classes (intervals) are mutually_____ and_____.

102) A_____ for a numerical variable is a table that shows the number of observations that fall into specific interval.

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

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104) In a cumulative frequency distribution, the percent of observations that falls below the upper limit of the last class is_____.

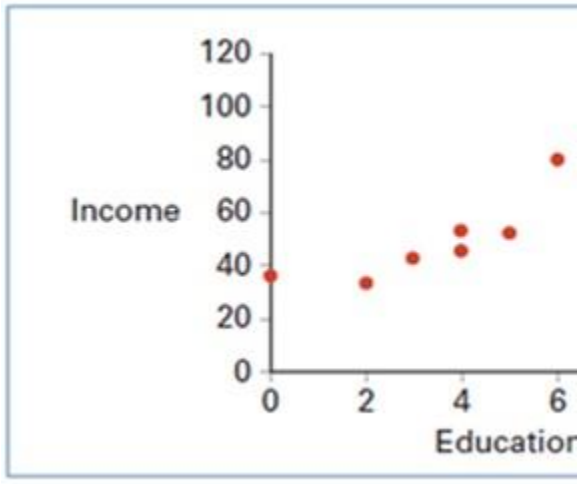
105) A scatterplot depicts a positive_____ relationship; as x increases, y tends to increase at an increasing rate.

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106) Using the scatterplot below we observe a _____ linear relationship between two variables: Education and Income.

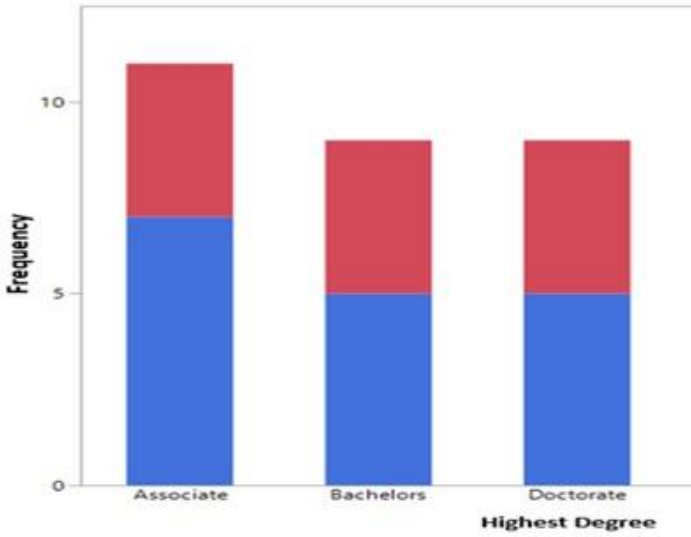


107) Using the contingency table below, we observe that most of the _____ have High School as their highest level of education.

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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

108) Using the stacked column chart below for males (M) and females (F), 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.

109) 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.

110) 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?

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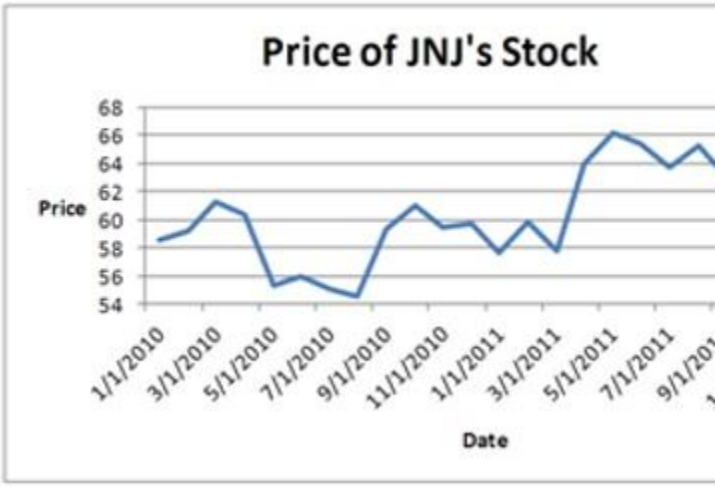
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111) The following table lists some of the busiest ports in the world based on the number of containers in a specific year.

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?

112) 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.



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113) 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.

114) 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

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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?

115) 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. Approximately 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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116) The accompanying cumulative relative frequency distribution shows a summary of the scores from an Algebra exam for a sample of twenty students at a local high school. The lowest and highest scores were 52 and 98, respectively.

Class	Cumulative Relative Frequency
50 up to 60	0.05
60 up to 70	0.20
70 up to 80	0.45
80 up to 90	0.80
90 up to 100	1.00

a. Outside of Connect, construct the relative frequency distribution. What proportion of students scored between 80 up to 90?

b. Outside of Connect, construct the frequency distribution. How many students scored between 70 up to 80?

117) 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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118) 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

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119) 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

Click here for the Excel Data File

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?

120) A sample of 25 voters participating in a recent election exit poll in Utah were asked to state their political party affiliation. Coding the data 1 for Republican, 2 for Democrat, and 3 for Independent, the data collected were as follows: 1, 1, 2, 3, 1, 2, 3, 2, 2, 2, 3, 2, 1, 1, 3, 2, 1, 1, 1, 1, 3, 1, 1, 1, and 2. Develop a frequency distribution and a relative frequency distribution for the data. What does the data suggest about the strength of the political parties in Utah?

121) A professor of statistics wants to study the relationship between income and education. A sample of 10 individuals is selected at random, and their income (in $1000s) and education (in years) are shown below:

Education	13	15	11	12	14	9	11	16	14	13
Income	50	56	45	49	53	40	46	60	54	52

Click here for the Excel Data File

a. Construct a scatterplot for the data
b. Does a relationship exist between education and income?

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Answer Key

Test name: Chapter 02

1) FALSE
A frequency distribution for a categorical variable groups the observations into categories and records the number of observations that fall into each category.

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, the lengths of which are proportional to the values that are to be depicted.

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, x and y, where each cell represents a mutually exclusive combination of the pair of x and y values.

8) FALSE
A stacked column chart is an advanced version of a bar chart designed to visualize more than one categorical variable, plus they allow for the comparison of composition within each category.

9) FALSE
This formula is used when we construct a frequency distribution or a histogram for numerical (quantitative) data. The number of classes (intervals) 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 interval.

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

13) FALSE

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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.

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

15) FALSE
The number of intervals depend on the size of the data set. The total number of intervals usually ranges from 5 to 20.

16) TRUE
A histogram is a series of rectangles where the width and height of each rectangle represent the interval width and frequency (or relative frequency) of the respective interval.

17) TRUE
A histogram is a series of rectangles where the width and height of each rectangle represent the interval width and frequency (or relative frequency) of the respective interval. The histogram can be categorized as symmetric or skewed (positively or negatively skewed).

18) FALSE
For numerical data, a frequency distribution groups the observations into intervals (called classes) and records the number of observations that falls within each class. The original observations cannot be determined once they are grouped in a frequency distribution.

19) TRUE
A scatterplot illustrates whether or not two numerical variables are related. Each point in a scatterplot represents a paired observation for the two variables.

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

21) B
Histograms describe numerical data. Contingency tables show the frequencies for two categorical variables. Line charts display numerical data over time.

22) B
The percent frequency is defined as the corresponding relative frequency multiplied by 100.

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

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

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

26) 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 percentage for Tokyo or Beijing individually.

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

28) B
Six million dollars was spent in total and 10% of the $6 million was spent on mold: $6,000,000 × 0.10 = $600,000.

29) 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.

30) 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.

31) B
The score of 3 occurred twelve times and the second-most frequent number was 1 with five occurrences.

32) B
The score of 3 occurred nine times and the second-most frequent number was 5 with eight occurrences.

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

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

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

36) B
The color corresponding to Julia Child has the largest segment in the pie chart (24%).

37) A
This is a bar chart that is used to display categorical data.

38) C
The data are categorical representing the authors of various cookbooks, and nominal since no ordering is present in the categories.

39) A
Each category is placed on the vertical axis and the range of values on the horizontal axis.

40) A

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

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

42) D
Histograms are used to display the relative frequency of a numerical variable. A contingency table is used to display the frequencies for two categorical variables, while the bar chart and pie chart display categorical data.

43) C
Intervals width = (Maximum − Minimum) ÷ (Number of intervals) = (92 − 16) ÷ 5 = 15.20 ≈ 16 (We always round up.)

44) C
Interval width = (Maximum − Minimum) ÷ (Number of intervals) = (84 − 16) ÷ 5 = 13.6 ≈ 14 (We always round up.)

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

46) 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.

47) A
Interval width = (maximum value − minimum value) ÷ (Number of intervals) = (269 − 109) ÷ 5 = 32.00; so round up to 32.

48) C
Interval width = (maximum value − minimum value) ÷ (Number of intervals) = (239 − 115) ÷ 5 = 24.8; so round up to 25.

49) 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 interval is 7/24.

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

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51) B
Ten students scored at least 1,800 but less than 2,000.

52) C
Twelve students scored at least 1,800 but less than 2,000.

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

54) B
Seven of the 30 students, or about 0.23, scored more than 1,600 but less than 1,800.

55) B

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Sum the frequency column to obtain the total number of observations in the frequency distribution, which is 38.

56) C
Sum the frequency column to obtain the total number of observations in the frequency distribution, which is 20.

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

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

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

60) B
We sum the frequencies in the first three classes and then divide the sum by 20: (3 + 6 + 3) ÷ 20.

61) C
Use frequencies shown on the histogram for different number of pages in the book. The frequency of books containing at least 250 but fewer than 300 pages is the frequency for the 250-300 interval, which is 7.

62) B
The frequency of books containing at least 200 but fewer than 250 pages is the frequency for the 200-250 interval, which is 5.

63) C
The frequency of books containing at least 250 but fewer than 400 pages is the sum of the frequencies, 7, 3, and 1, for the classes 250 up to 300, 300 up to 350, and 350 up to 400.

64) B
The number of stocks with returns of 0% up to 10% is the frequency of the 0 up to 10 interval, which is 23.

65) D
The number of stocks with returns of 0% up to 10% is the frequency of the 0 up to 10 interval, which is 25.

66) C
The number of stocks with returns of less than 10% is the sum of the frequencies in the -10 up to 0 and 0 up to 10 intervals, which is 8 + 25 = 33.

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67) B
The proportion of stocks with returns of 0% up to 10% is the frequency of the 0% up to 10% interval divided by the total frequencies; namely 25 ÷ 50 = 0.50.

68) C
The proportion of stocks with returns of less than 10% is the sum of the frequencies of the −10 up to 0 and 0 up to 10 intervals divided by the total frequencies; namely (8 + 25) ÷ 50 = 0.66.

69) C

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The number of cars travelled less than 75 miles per hour is the sum of the frequencies in the first three intervals; namely 272 + 317 + 52 = 641.

70) C
The number of cars travelled less than 75 miles per hour is the sum of the frequencies in the first three intervals; namely 275 + 325 + 50 = 650.

71) B
The proportion of the cars travelled at least 55 but less than 65 miles per hour is the frequency of the 55 up to 65 interval divided by the total frequencies; namely 325 ÷ 675 = 0.48.

72) B
Eighty-Seven students scored less than 90, and 31 students scored less than 70. The number of students 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 which is 87 − 31 = 56.

73) C
Eighty-eight students scored less than 90, and 33 students scored less than 70. The number of students 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 which is 88 − 33 = 55.

74) D
Sum the frequency of the intervals 200 up to 300, 300 up to 400, 400 up to 500, and 500 up to 600 and divide by the total frequency: (8 + 7 + 5 + 1) ÷ 26 = 21 ÷ 26 ≈ 0.81, or 81%.

75) D
Seven percent of the 100 salespeople have sold at least 35 cars but fewer than 45 cars in the last year; then 0.07(100) = 7 employees

76) B
Seven percent of the 100 salespeople have sold at least 35 cars but fewer than 45 cars in the last year; then 0.07(100) = 7 employees

77) D
Forty six percent of the 100 salespeople have sold at least 45 cars but fewer than 65 cars in the last year; then (0.15 + 0.31)100 = 46 employees.

78) D
Forty seven percent of the 100 salespeople have sold at least 65 cars; then (0.22 + 0.25)100 = 47 employees.

79) D
A linear and curvilinear relationships or even no relationship may be seen in a scatterplot. The relationships, if they exist, can also be categorized as positive or negative. Causality is determined based on the experimental design and not on the relationship of the line.

80) D

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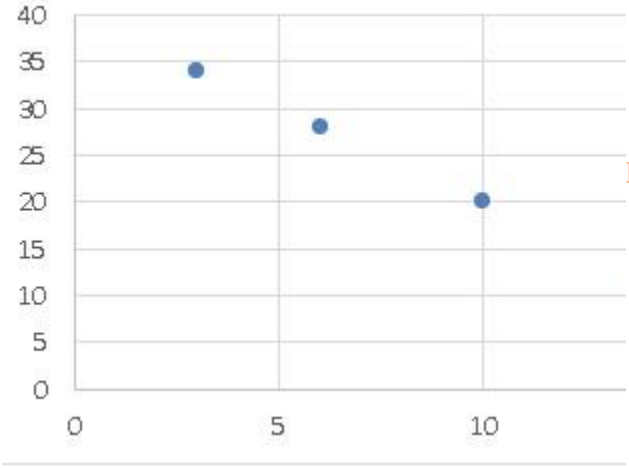
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The scatterplot indicates that the variables have a positive relationship (*y* tends to increase as *x* increases), and the relationship appears linear or slightly curvilinear.

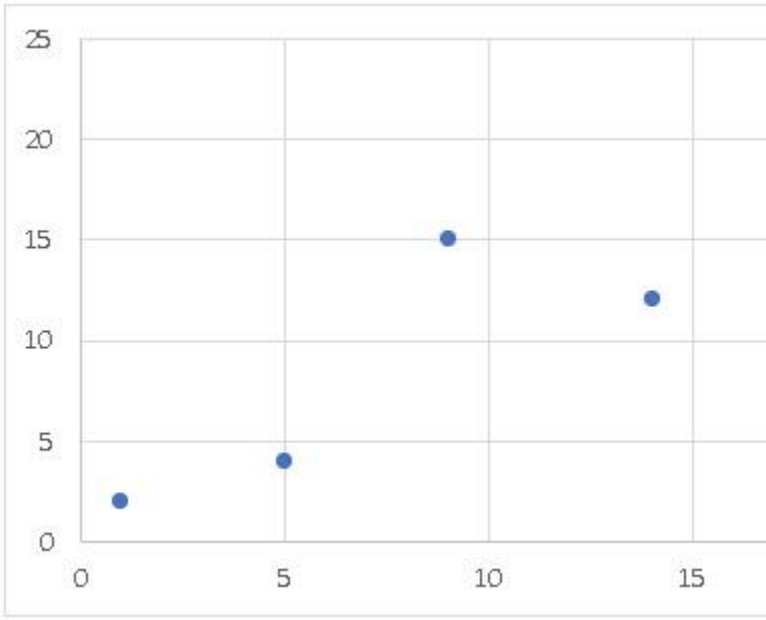
81) B
The scatterplot indicates that the variables have a negative relationship (*y* tends to decrease as *x* increases), and the relationship appears linear or slightly curvilinear.

82) C
The scatterplot indicates that the variables have a negative relationship (*y* tends to decrease as *x* increases), and the relationship appears linear.



83) B

The scatterplot indicates that *y* tends to increase as *x* increases. Therefore, the data have a positive relationship. Even though the point (9,15) is not in line with the rest of the points, overall the plot shows an increasing positive relationship.



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

85) D
A frequency distribution for categorical data groups the observations into categories and records the number of observations that fall into each category. The sum of frequencies for bars 3, 4, & 5 = 22 + 13 + 8 = 43. Therefore, 43 statistics classes had three or more students absent per class.

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

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

89) D
In this case, ({{[a(6)]:#,###}} + {{[a(7)]:#,###}} + {{[a(8)]:#,###}} + {{[a(9)]:#,###}}) ÷ ({{[a(6)]:#,###}} + {{[a(7)]:#,###}} + {{[a(8)]:#,###}} + {{[a(9)]:#,###}} + {{[a(10)]:#,###}}) = {{[a(6)]:#,###}} ÷ {{[a(13)]:#,###}} = {{[a(14)]:#,###.00}}%.

For numerical data, a relative frequency distribution identifies the proportion of observations that falls into each category, and the percentage frequency for each category equals the relative frequency of the category multiplied by 100. Twelve homes out of 45 on the market have an asking price between $350,000 and under $400,000. Therefore, the required percentage = (10 ÷ 45)*100 = 22.2%

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

For numerical data, a relative frequency distribution identifies the proportion of observations that falls into each category, and the percentage frequency for each category equals the relative frequency of the category multiplied by 100. Twelve homes out of 55 on the market have an asking price between $350,000 and under $400,000. Therefore, the required percentage = (12 ÷ 55)*100 = 21.8%

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

For numerical data, a relative frequency distribution identifies the proportion of observations that falls into each category, and the percentage frequency for each category equals the relative frequency of the category multiplied by 100. Forty nine homes (12 + 9 + 17 + 11) out of 55 on the market have an asking price under $550,000. Therefore, the required percentage = (49 ÷ 55)*100 = 89.1%

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

Forty one percent (30% + 11%) of the respondents to the survey said they will either put the unexpected tax refund in the bank or spend it. To get a frequency, the percent frequency should be multiplied by the total number of observations. Therefore, (30% + 11%) * 1026 = 421

93) B

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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. Therefore, the percentage of people who live below the poverty level in the West or Midwest is (7237 + 8372) ÷ 37276 = 41.87%

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

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

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

97) D
A histogram is a series of rectangles where the width and height of each rectangle represent the interval width and frequency (or relative frequency) of the respective interval. The histogram can be categorized as symmetric or skewed (positively or negatively skewed) as stated in the choices above.

98) D
The cumulative relative frequency for a particular class indicates the proportion (fraction) of observations that falls below the upper limit of that class. We calculate the cumulative relative frequency of each class in one of two ways: (1) We can sum successive relative frequencies, or (2) We can divide the cumulative frequency of each class by the sample size.

99) C
This formula: (*Maximum value − Minimum value*) ÷ *Number of classes* is used to approximate the class width when we construct a frequency distribution or a histogram for numerical data. The number of classes (intervals) typically ranges from 5-20.

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

101) [exclusive, exhaustive]
When constructing a frequency distribution for a numerical variable, the intervals do not overlap (mutually exclusive); that is, each observation falls into one, and only one, interval. In addition, every observation has to fit into one of the intervals; that is, the intervals must include all the observations in the data set (exhaustive).

102) frequency distribution

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For numerical data, a frequency distribution groups data into intervals called classes and records the number of observations that falls within each class.

103) [symmetric, skewed]
A histogram provides information on the shape of the distribution. In general, the shape of most distributions can be categorized as either symmetric or skewed (positively or negatively skewed).

104) 100%
A cumulative frequency distribution records the number of observations that falls below the upper limit of each class. The cumulative frequency of the first class is the same as the frequency of the first class. However, the cumulative frequency of the last class is equal to the sample size, or equivalently 100% of the observations.

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

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

107) 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.

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

109) Short Answer
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

In order to construct the frequency distribution, multiply each relative frequency by 400, the sample size. Forty people designated that the computer and mathematical industry was their job interest. For the pie chart, each segment corresponds to the relative frequency for each job category.

110) Short Answer

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

A frequency distribution for a categorical variable (hair color) groups the observations into categories and records the number of observations that fall into each category. The relative frequency for each category equals the proportion of observations in each category. To construct a pie chart in Excel, select both columns of data in the relative frequency distribution, 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 in the frequency distribution, and then select **Insert > Column > 2-D Column**. Choose the option at the top left. See instructions in text for other formatting options. The relative frequency distribution or the pie chart show that blond (32%) is the most common color among the stylist's customers. The frequency distribution and the bar chart show that six customers have black color.

111) 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 in the relative frequency distribution, 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%.

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112) Short Answer
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 2.7 in the text, where graphs with misleading scales for the vertical axis are shown.

113) Short Answer

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0.095.
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

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First find the total number of people surveyed by summing the frequency column (n = 140,335).

c. 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.

d. 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.

e. 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.

114) Short Answer

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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

f. 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 of each class and add it to the preceding class's cumulative relative frequency. For the first class, the cumulative relative frequency is simply the relative frequency of that class. The cumulative relative frequency for the last class is always one (subject to rounding).

g. Use the distributions computed in part a. to answer these questions.

h. 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.

115) Short Answer

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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.

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		

116) Short Answer

0.35
5

Class	Cumulative Relative Frequency	Relative Frequency	Frequency
50 up to 60	0.05	0.05	1
60 up to 70	0.20	0.15	3
70 up to 80	0.45	0.25	5
80 up to 90	0.80	0.35	7
90 up to 100	1.00	0.20	4

i. 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 80 up to 90 is 0.80 − 0.45 = 0.35.

j. 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 70 up to 80 is 0.25 × 20 = 5.

117) Short Answer

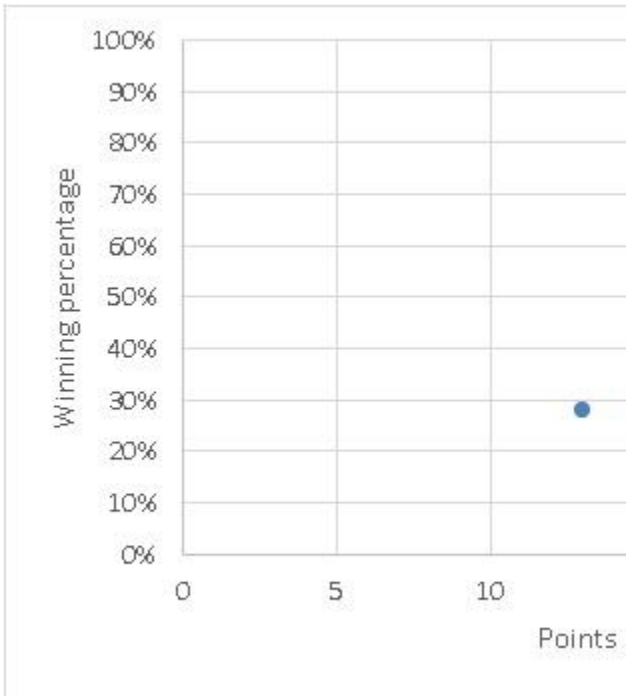
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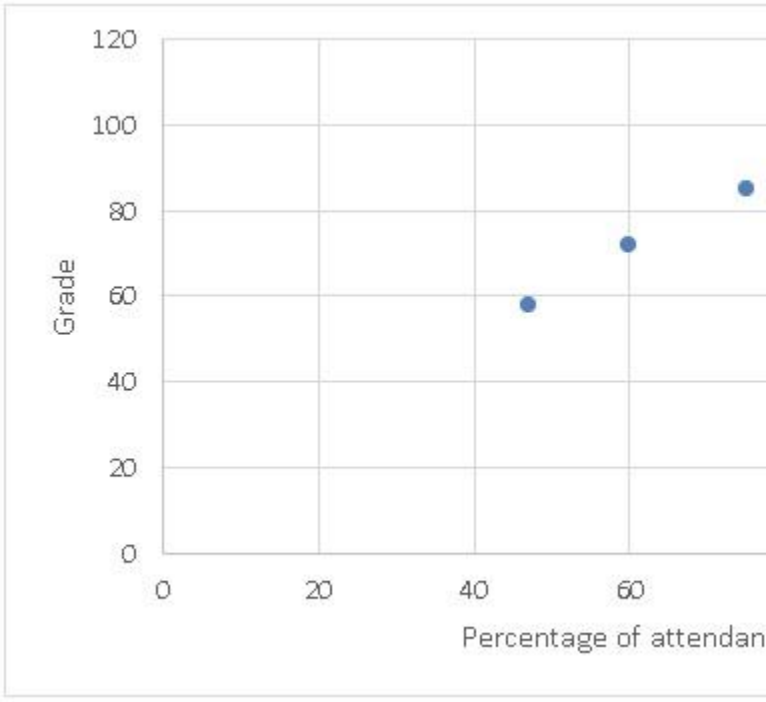
Teams with higher points per game tend to have a higher winning percentage.



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. The relationship is clearly positive (as points per game increase, the winning percentage tends to increase). In other words, teams that score more points tend to have a higher winning percentage.

118) Short Answer
Yes, there appears to be a positive relationship.

<p style="margin-bottom: 20px;">



To construct the scatterplot, plot each attendance-grade combination, where, in our answer key, the percentage of attendance corresponds to the value on the horizontal axis and the grade corresponds to the value on the vertical axis. There is a clear positive relationship; as the percentage of attendance increases, the grade tends to increase. In other words, we can say that the two variables are related.

119) Short Answer
The wild-caught salmon has an upward trend in demand.

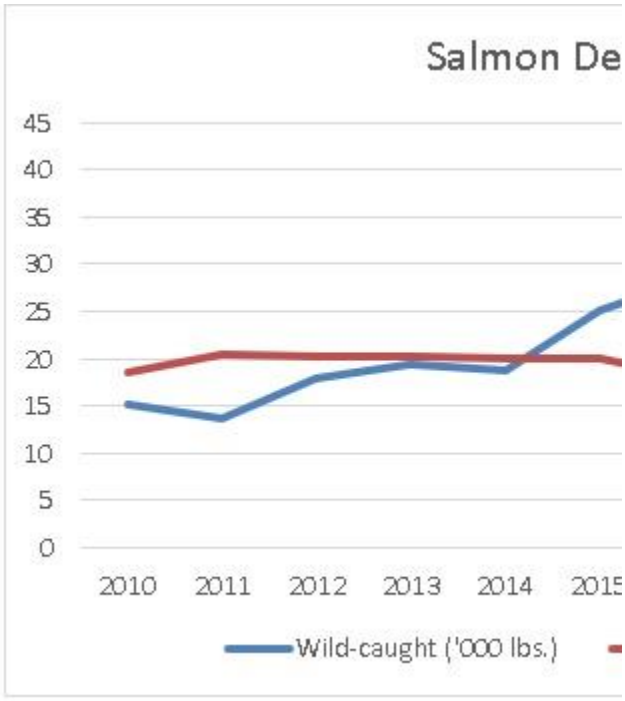
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To construct the line chart in Excel, select the cells that contain the entire data set. From the menu, select Insert > Chart > Line. Add/edit the chart element as needed. The line for wild-caught salmon shows an upward trend as opposed to the downward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

To construct the scatterplot, plot each education-income combination, where, in our answer key, years of education corresponds to the values on the horizontal axis and income corresponds to the values on the vertical axis.

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l. There is a strong positive relationship; as years of education increase, income tends to increase. In other words, we can say that the two variables are strongly related.

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120) Short Answer

Party	Frequency	Relative Frequency
Republican	12	0.48
Democratic	8	0.32
Independent	5	0.20

The Republican Party in Utah is stronger than the Democratic party as well as independent

121) Short Answer

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