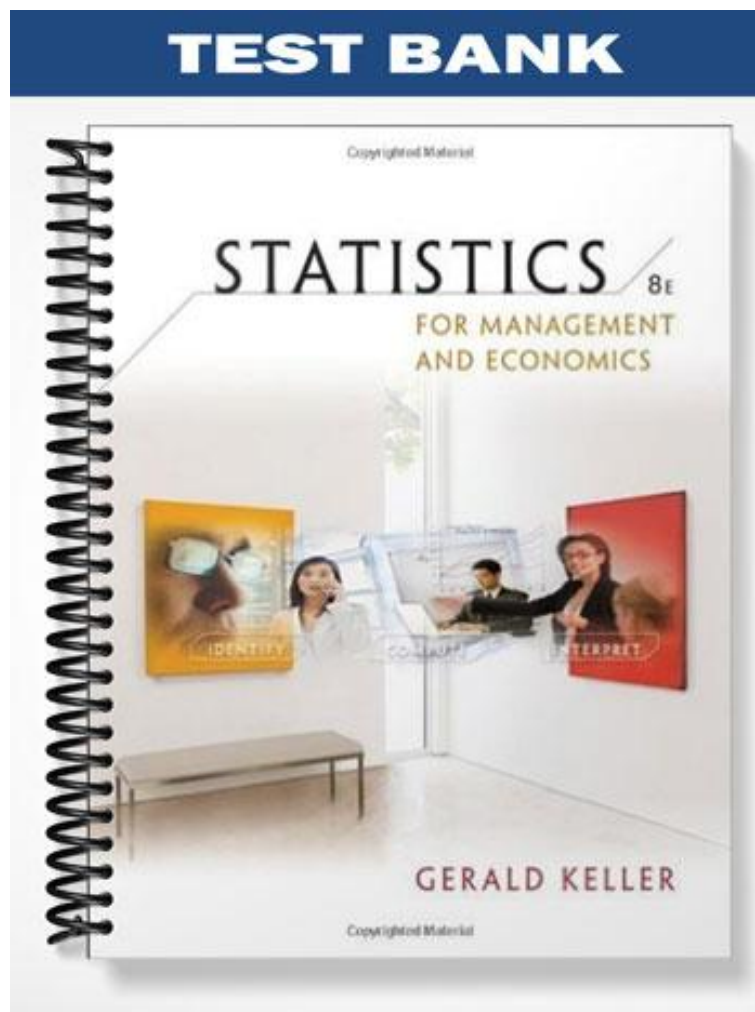


TEST BANK



Ch2

Multiple Choice

Identify the choice that best completes the statement or answers the question.

- ___ 1. The classification of student major (accounting, economics, management, marketing, other) is an example of a(n)
- nominal random variable.
 - interval random variable.
 - continuous random variable.
 - parameter.
- ___ 2. The classification of student class designation (freshman, sophomore, junior, senior) is an example of a(n)
- nominal random variable.
 - interval random variable.
 - ordinal random variable.
 - a parameter.
- ___ 3. A researcher wishes to estimate the textbook costs of first-year students at Ferris State University. To do so, he recorded the textbook cost of 200 first-year students and found that their average textbook cost was \$275 per semester. The variable of interest to the researcher is
- textbook cost.
 - class rank.
 - number of students.
 - name of university.
- ___ 4. All calculations are permitted on what type of data?
- Interval data
 - Nominal data
 - Ordinal data
 - All of these choices are true.
- ___ 5. Values must represent ordered rankings for what type of data?
- Interval data
 - Nominal data
 - Ordinal data
 - None of these choices.
- ___ 6. For what type of data are frequencies the only calculations that can be done?
- Interval data
 - Nominal data
 - Ordinal data
 - None of these choices.
- ___ 7. For which type of data are the values arbitrary numbers?
- Interval data
 - Nominal data
 - Ordinal data
 - None of these choices.
- ___ 8. Which of the following statements about pie charts is false?
- A pie chart is a graphical representation of a relative frequency distribution.

- b. You can always determine frequencies for each category by looking at a pie chart.
- c. The total percentage of all the slices of a pie chart is 100%.
- d. The area of a slice of a pie chart is the proportion of all the individuals that fall into that particular category.

- _____ 9. Which of the following situations is best suited for a pie chart?
- a. The number of dollars spent this year on each type of legal gambling.
 - b. The percentage of a charitable donation that goes to administrative costs vs. directly to the charity.
 - c. The number of students in your class who received an A, B, C, D, F on their exam.
 - d. All of these choices are true.

- _____ 10. Which situation identifies when to use pie charts and/or bar charts?
- a. You want to describe a single set of data.
 - b. Your data is nominal.
 - c. You want to show the number or the percentage of individuals in each category.
 - d. All of these choices are true.

- _____ 11. Suppose you measure the number of minutes it takes an employee to complete a task, where the maximum allowed time is 5 minutes, and each time is rounded to the nearest minute. Data from 130 employees is summarized below. How long did it take most employees to complete the task?

Time (minutes)	1	2	3	4	5
Frequency	15	30	40	25	20

- a. 5 minutes
- b. 3 minutes
- c. 40 minutes
- d. 20 minutes

- _____ 12. Car buyers were asked to indicate the car dealer they believed offered the best overall service. The four choices were Carriage Motors (C), Marco Chrysler (M), Triangle Auto (T), and University Chevrolet (U). The following data were obtained:

T C C C U C M T C U
 U M C M T C M M C M
 T C C T U M M C C T
 T U C U T M M C U T

What percentage of car buyers identified Carriage Motors as having the best overall service?

- a. $1/4 = 0.25$ or 25%
- b. $14/40 = 0.35$ or 35%
- c. 14%
- d. None of these choices.

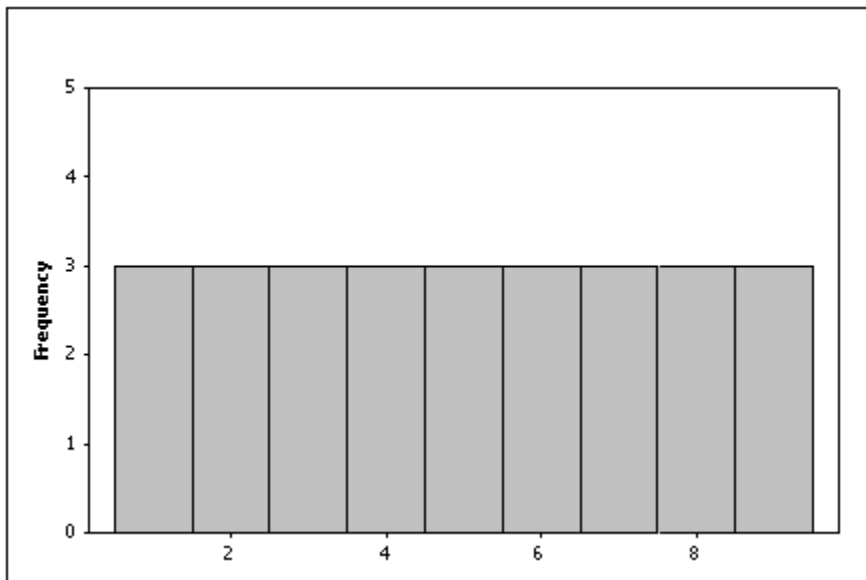
- _____ 13. Which of the following represents a graphical presentation of interval data?
- a. A bar chart.
 - b. A histogram.
 - c. A pie chart.
 - d. All of these choices are true.

- _____ 14. Which of the following statements about histograms is false?

- a. A histogram is a summary of interval data.
- b. A histogram is made of a series of intervals, called classes.
- c. The classes in a histogram cover the complete range of observations.
- d. All of these choices are true.

- _____ 15. Which of the following statements about histograms is false?
- a. The intervals of a histogram do not overlap.
 - b. Every observation is assigned to one and only one class in a histogram.
 - c. The intervals of a histogram are equally wide.
 - d. None of these choices.

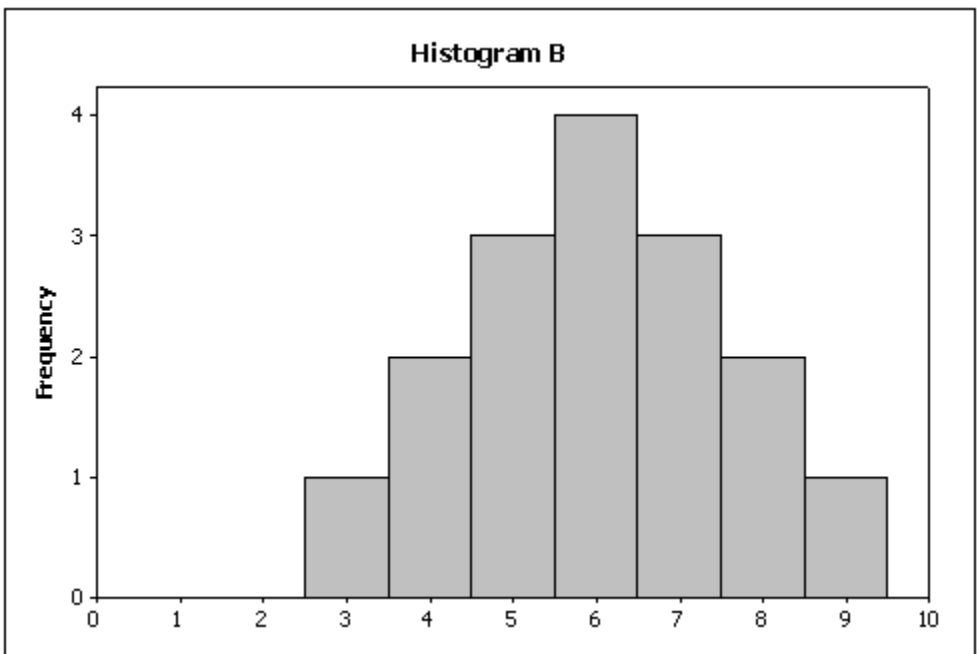
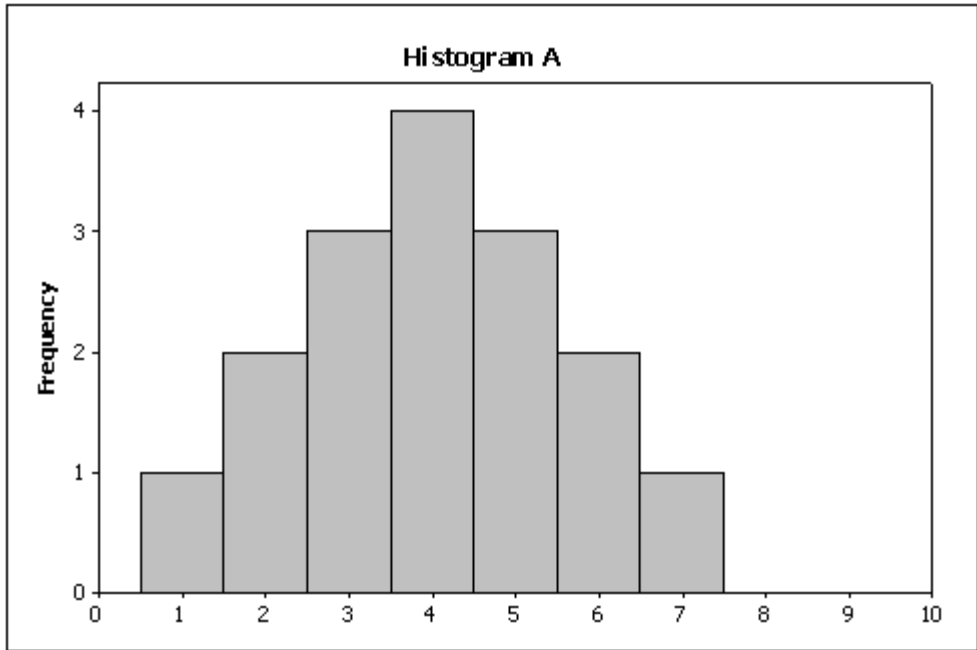
- _____ 16. Which of the following describes the shape of the histogram below?



- a. Positively skewed
- b. Negatively skewed
- c. Symmetric
- d. None of these choices

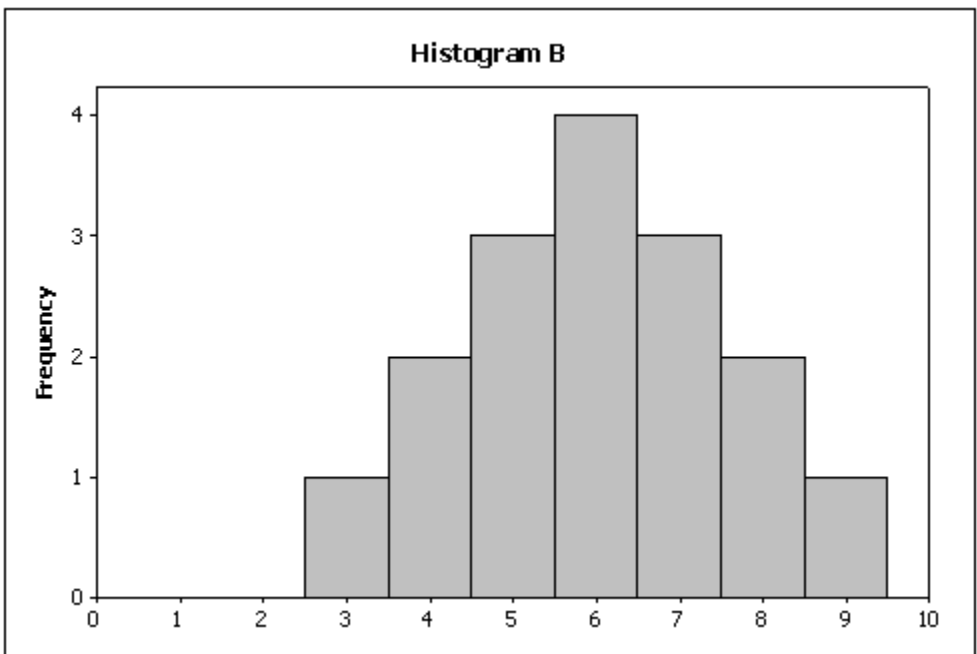
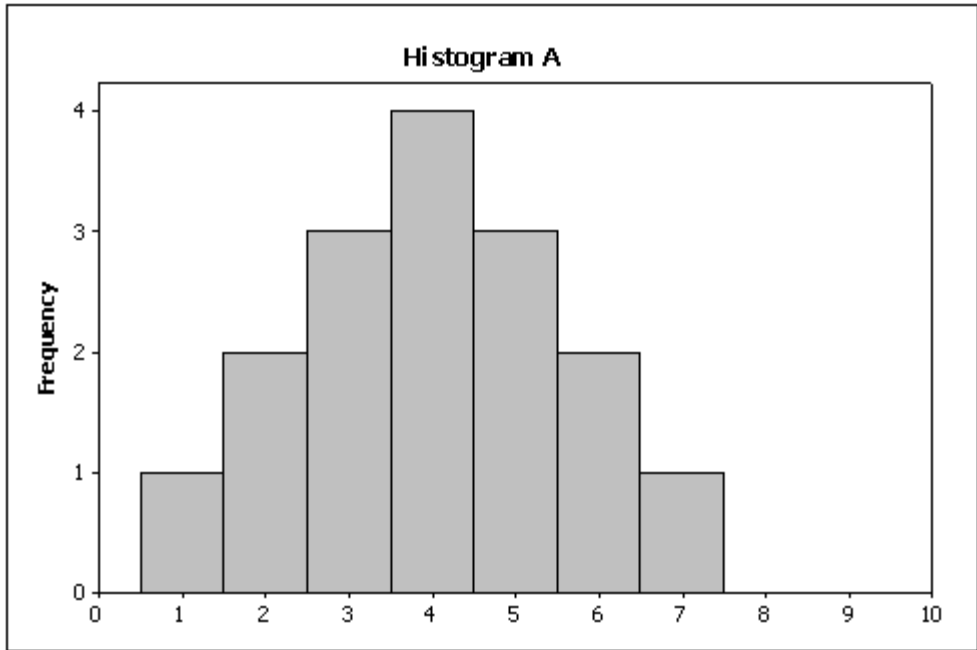
- _____ 17. The relative frequency of a class in a histogram is computed by
- a. dividing the frequency of the class by the number of classes.
 - b. dividing the frequency of the class by the class width.
 - c. dividing the frequency of the class by the total of all frequencies.
 - d. None of these choices.

- _____ 18. Compare the two histograms below. Which statement is true?



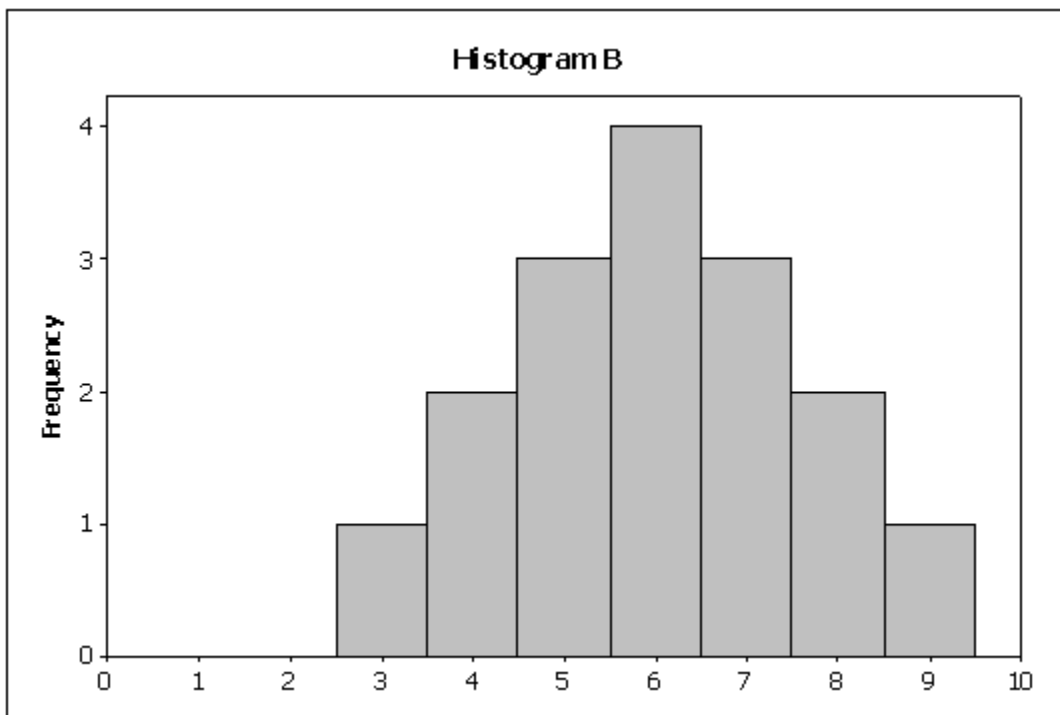
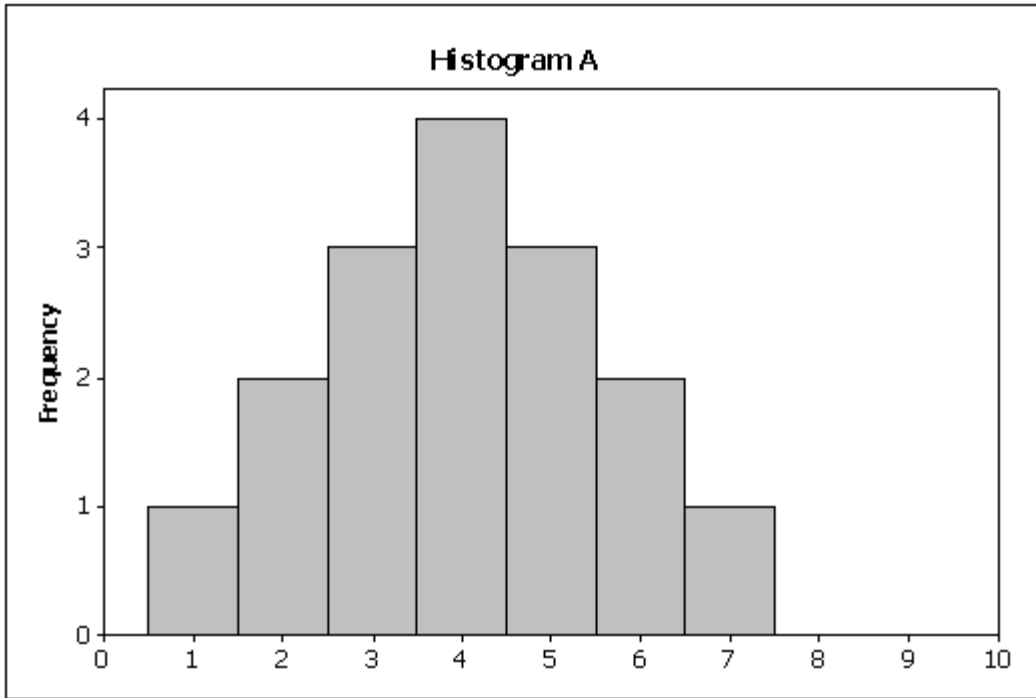
- a. The center of histogram A is lower than the center of histogram B.
- b. The center of histogram A is higher than the center of histogram B.
- c. The center of histogram A is the same as the center of histogram B.
- d. You cannot compare the centers of these two histograms without the original data.

___ 19. Compare the two histograms below. Which statement is true?



- a. The spread of histogram A is smaller than the spread of histogram B.
- b. The spread of histogram A is larger than the spread of histogram B.
- c. The spread of histogram A is the same as the spread of histogram B.
- d. You cannot compare the spreads of these two histograms without the original data.

___ 20. Compare the two histograms below. Which statement is true?



- The shape of histogram A is the same as the shape of histogram B.
- The shape of histogram A is positively skewed compared to histogram B.
- The shape of histogram A is negatively skewed compared to histogram B.
- You cannot compare the shapes of these two histograms without the original data.

___ 21. A modal class in a histogram is the class that includes

- the largest number of observations.

- b. the smallest number of observations.
- c. the largest observation in the data set.
- d. the smallest observation in the data set.

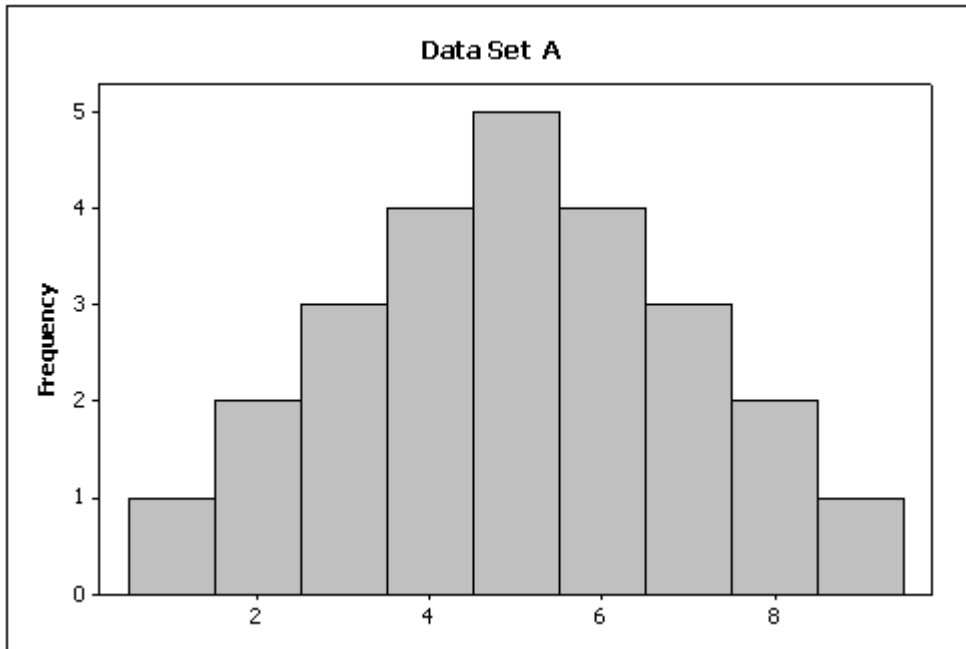
_____ 22. The sum of the relative frequencies for all classes in a histogram always equals

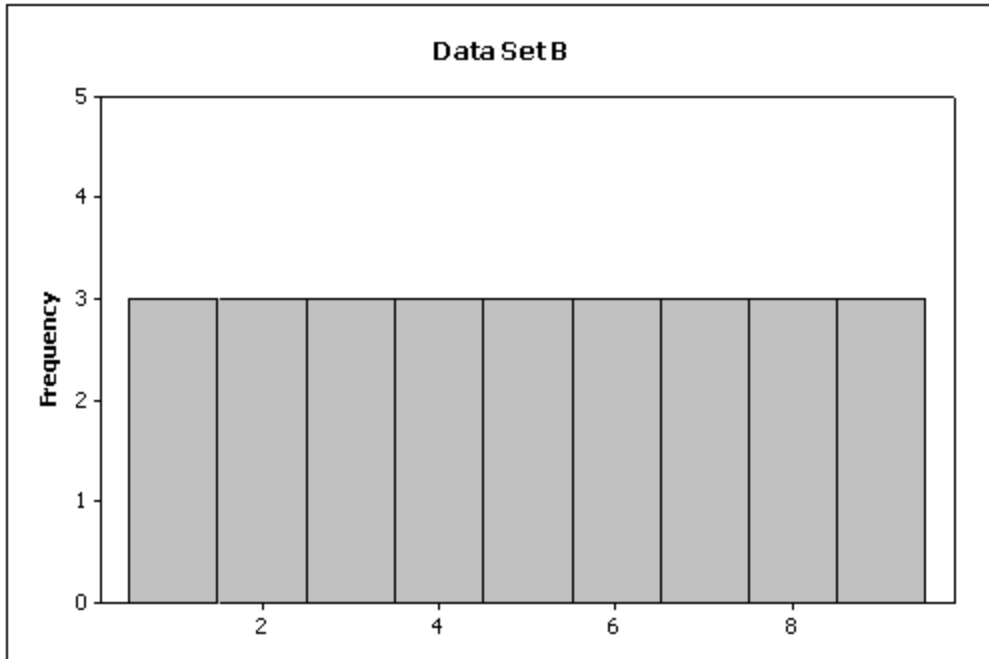
- a. the number of classes.
- b. the class width.
- c. the total of all the frequencies.
- d. one.

_____ 23. 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 the center of the histogram, the two sides are identical in shape and size.
- b. A negatively skewed histogram is one with a long tail extending to the left.
- c. A positively skewed histogram is one with a long tail extending to the right.
- d. All of these choices are true.

_____ 24. Compare the spread of the two histograms below. Which of the following is true?





- a. Data Set A has a larger spread than Data Set B.
 - b. Data Set A has a smaller spread than Data Set B.
 - c. Data Set A has the same spread as Data Set B.
 - d. You cannot compare the spreads of these histograms without the original data.
- ___ 25. Which of the following is true about a stem-and-leaf display?
- a. You can recreate the original data set from it.
 - b. Its shape resembles a histogram turned on its side.
 - c. It provides an organized way to depict interval data.
 - d. All of these choices are true.
- ___ 26. What does the length of each line of a stem-and-leaf display represent?
- a. The percentage of observations in the interval represented by that stem.
 - b. The number of observations in the interval represented by that stem.
 - c. The total frequency of observations within or below that stem.
 - d. The number of digits to the left of the decimal point.
- ___ 27. What values are displayed on a cumulative relative frequency distribution?
- a. The number of observations that fall into each class interval.
 - b. The proportion of observations that fall into each class interval.
 - c. The number of observations that fall below each class interval.
 - d. The proportion of observations that fall below each class interval.
- ___ 28. Which of the following describes an ogive?
- a. A graphical representation of frequencies.
 - b. A graphical representation of relative frequencies.
 - c. A graphical representation of cumulative frequencies.
 - d. A graphical representation of cumulative relative frequencies.
- ___ 29. Observations that are measured at successive points in time is what type of data?
- a. Time-series data

- b. Cross-sectional data
- c. Successive data
- d. None of these choices.

___ 30. Observations that are measured at the same time represent what type of data?

- a. Time-series data
- b. Cross-sectional data
- c. Synchronous data
- d. None of these choices.

___ 31. Which of the following represents time-series data?

- a. The length of time each of the top 100 stocks have been available on the NASDAQ.
- b. The most popular time of year that people purchase the top 100 stocks on the NASDAQ.
- c. The value of the #1 stock on the NASDAQ each month over a one-year period.
- d. All of these choices are true.

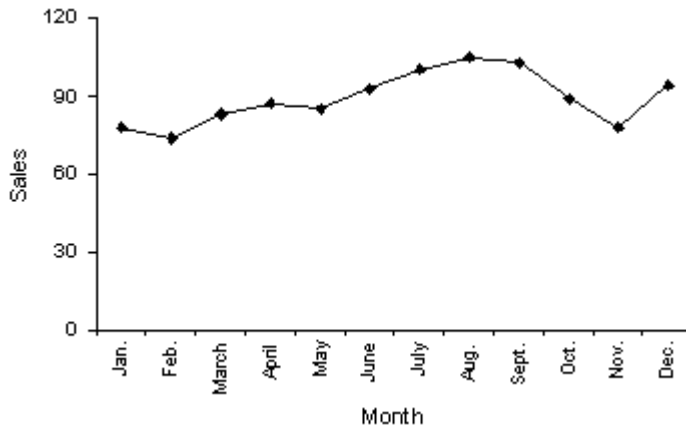
___ 32. Time-series data are often graphically depicted how?

- a. Bar chart
- b. Histogram
- c. Line chart
- d. All of these choices are true.

___ 33. Which of the following statements describes a line chart?

- a. A line chart is a graph of time-series data.
- b. A line chart is a plot of a variable over time.
- c. The horizontal axis of a line chart contains time periods.
- d. All of these choices are true.

___ 34. What type of graph depicts the data below?



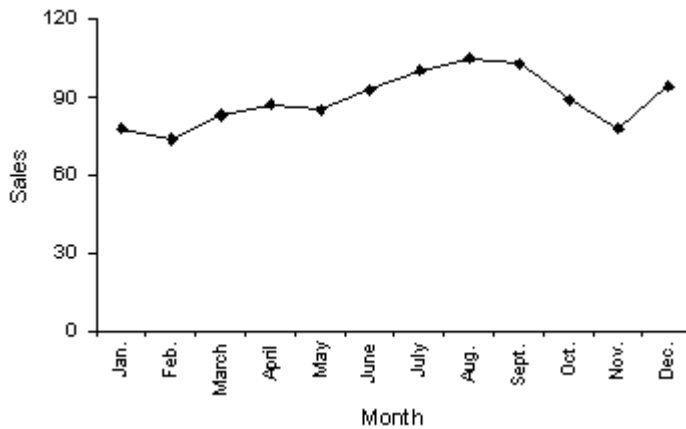
- a. A line chart
- b. A histogram
- c. A dot plot
- d. A bar chart

___ 35. What kind(s) of data can be depicted by a line chart?

- a. Frequencies of an interval over time.
- b. Frequencies of a nominal variable over time.
- c. Relative frequencies of a nominal variable over time.

d. All of these choices are true.

___ 36. Which of the following statements describe(s) the line chart below?



- a. November experienced the lowest sales throughout the year.
- b. August experienced the highest sales throughout the year.
- c. Sales did not fluctuate more than 30 units on either side of 90.
- d. All of these choices are true.

___ 37. When studying the responses to two nominal questions, we should develop a

- a. cross-classification table.
- b. frequency distribution table.
- c. cumulative percentage distribution table.
- d. scatter diagram.

___ 38. Which of the following techniques can be used to explore relationships between two nominal variables?

- a. Comparing the relative frequencies within a cross-classification table.
- b. Comparing pie charts, one for each column (or row).
- c. Comparing bar charts, one for each column (or row).
- d. All of these choices are true.

___ 39. A statistics professor classifies his students according to their grade point average (GPA) and their gender. The resulting cross-classification table is shown below.

Gender	GPA		
	Under 2.0	2.0 – 3.0	Over 3.0
Male	5	25	10
Female	10	20	30

Which of the following describes the relationship between GPA and gender shown by this table?

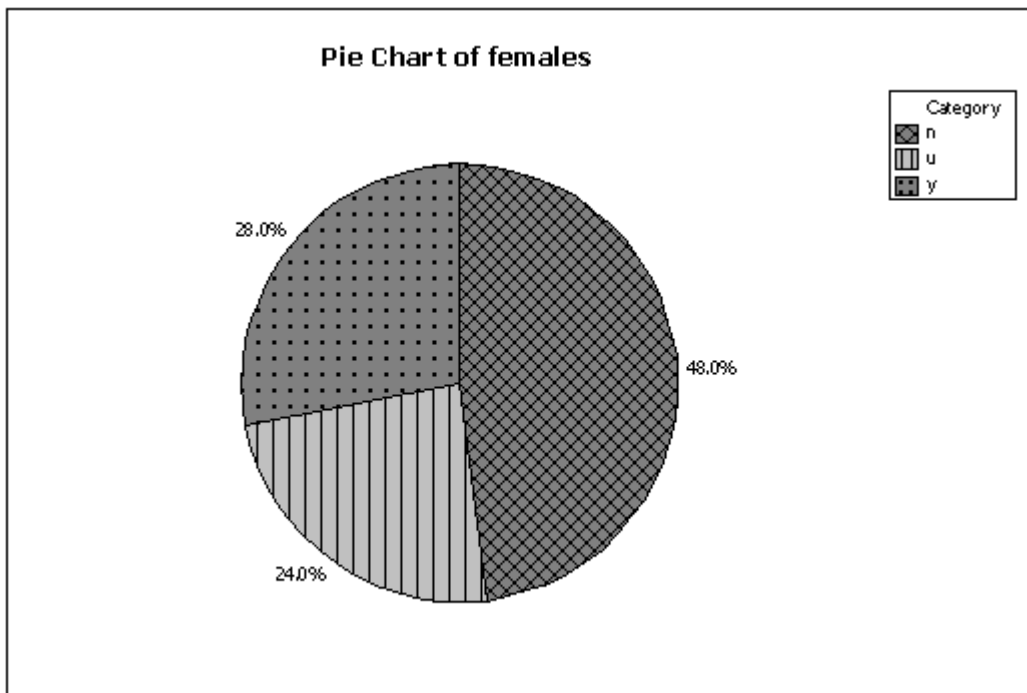
- a. A higher percentage of females have GPAs over 3.0, compared to males.
- b. A lower percentage of females have GPAs over 3.0, compared to males.
- c. Females and males each have the same percentage of GPAs over 3.0.
- d. You cannot compare male and female GPAs because the total number in each group is not the same.

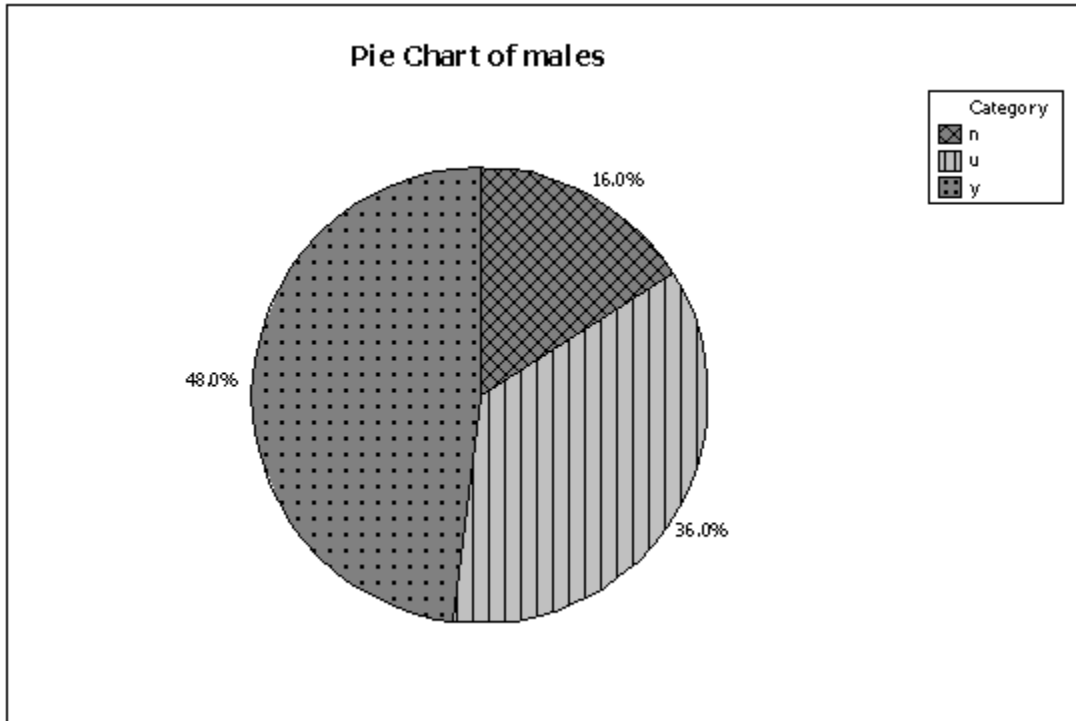
___ 40. In the following cross-classification table, how are gender and pet ownership related?

	Own a pet	Don't own a pet
Females	60	30
Males	80	40

- The percentage of pet owners is higher for males than for females.
- The percentage of pet owners is higher for females than for males.
- The percentage of pet owners is the same for females and males.
- You cannot compare percentages for males and females since the total frequencies are not equal.

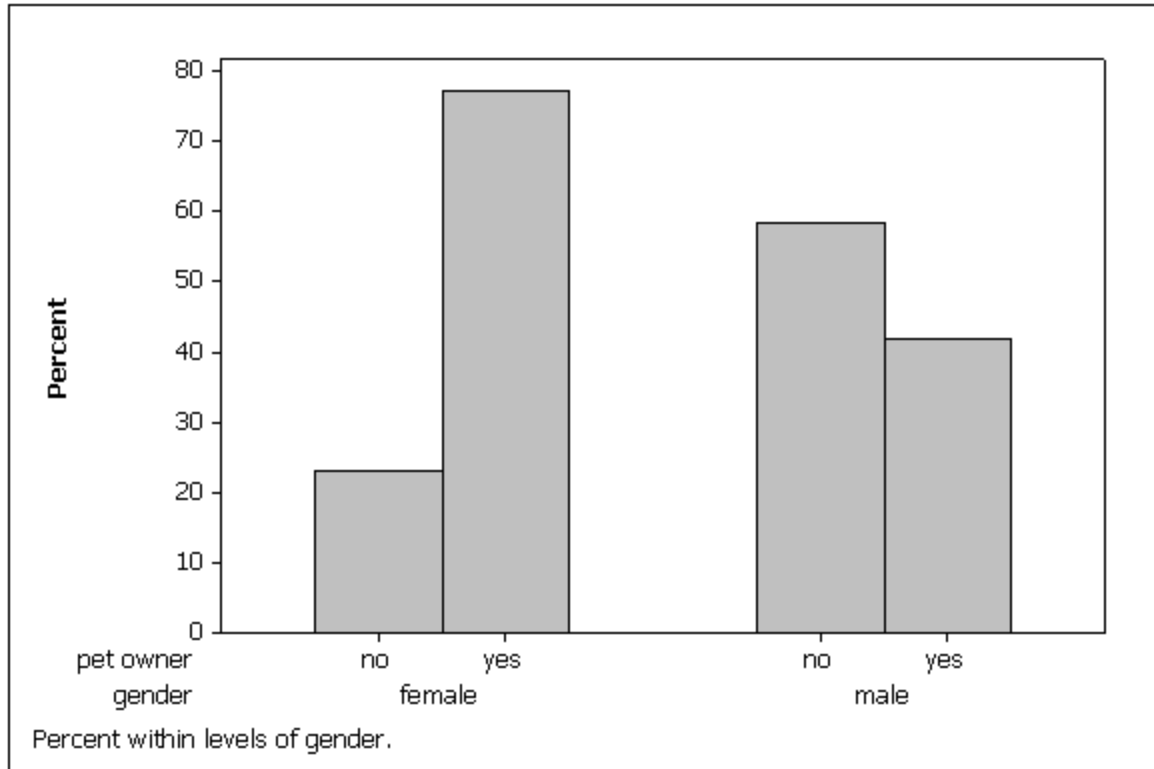
41. Two hundred males and two hundred females were asked whether or not college football should have a playoff system (yes/no/undecided). Pie charts of the responses for males vs. females are shown below. Which of the following describes the relationship between gender and opinion?





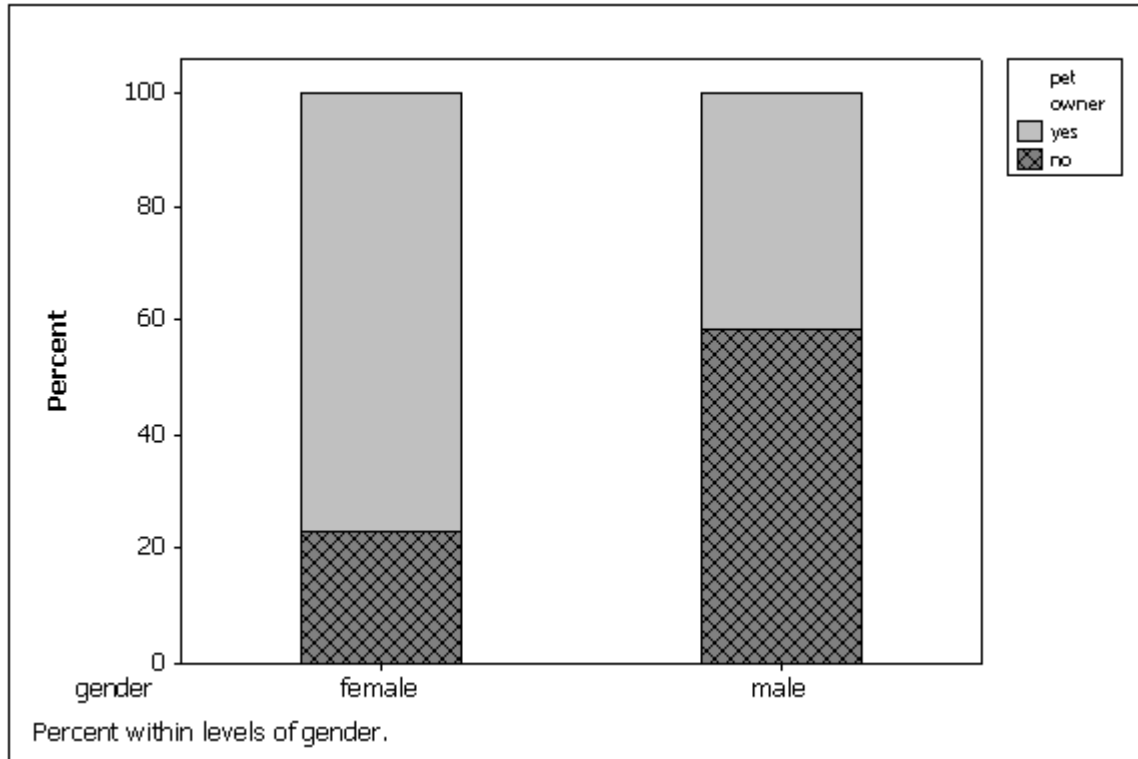
- a. A higher percentage of males want a playoff system compared to females.
- b. More males than females are undecided on this issue.
- c. Gender and opinion on a playoff system are related.
- d. All of these choices are true.

___ 42. A survey of 100 adults was conducted to see if gender is related to pet ownership. The results are summarized in the bar chart below. Which of the following statements describes the relationship?



- a. Pet ownership and gender are not related.
- b. More females own pets than don't own pets.
- c. Fewer males own pets than don't own pets.
- d. None of these choices.

___ 43. The bar charts below summarize data collected on 100 adults regarding gender and pet ownership. Which of the following statements is (are) true based on this chart?



- a. Gender and pet ownership are related; a higher percentage of males own pets than females.
- b. Gender and pet ownership are related; a higher percentage of females own pets than males.
- c. Gender and pet ownership are related; males and females own the same percentage of pets.
- d. Gender and pet ownership are not related.

- ___ 44. The relationship between two interval variables is graphically displayed by a
- a. scatter diagram
 - b. histogram
 - c. bar chart
 - d. pie chart
- ___ 45. In order to draw a scatter diagram, we need interval data for
- a. one variable
 - b. two variables
 - c. three variables
 - d. four variables
- ___ 46. Which of the following statements is false?
- a. You can examine the relationship between two nominal variables using a cross-classification table.
 - b. You can only apply statistical techniques to one variable at a time.
 - c. You can examine the relationship between two interval variables using a scatter diagram.
 - d. None of these choices.
- ___ 47. How do you determine whether two interval variables have a positive linear relationship?
- a. Most of the points fall close to a straight line with positive slope.
 - b. As the X variable increases, the Y variable increases in a linear way.
 - c. The scatter diagram shows a linear pattern that is going uphill.

- d. All of these choices are true.
- ___ 48. If the data in a scatter diagram is scattered completely at random, what do you conclude?
- There is no linear relationship between X and Y .
 - There is a strong linear relationship between X and Y .
 - There is a strong linear relationship between X and Y that is described by a horizontal (flat) line.
 - None of these choices.
- ___ 49. Which of the following is the method statisticians use to draw the best fitting straight line through the data on a scatter diagram?
- The fit best method.
 - The least squares method.
 - The point-intercept method.
 - None of these choices.
- ___ 50. Which of the following describes a positive linear relationship between X and Y ?
- As the X values increase, the Y values increase in a linear manner.
 - As the X values decrease, the Y values decrease in a linear manner.
 - The X and Y values move uphill together in a linear manner.
 - All of these choices are true.
- ___ 51. When two variables tend to move in opposite directions, yet still form a linear pattern, how do you describe their relationship?
- A positive linear relationship.
 - A negative linear relationship.
 - A proportional inverse relationship.
 - None of these choices.

True/False

Indicate whether the statement is true or false.

- ___ 52. Your gender is a nominal variable.
- ___ 53. Your final grade in a course (A, B, C, D, E) is a nominal variable.
- ___ 54. Your age is an interval variable.
- ___ 55. Your age group (1-10; 11-20; 21-30; 31-40; etc.) is an interval variable.
- ___ 56. Whether or not you are over the age of 21 is a nominal variable.
- ___ 57. The values of quantitative data are categories.
- ___ 58. Interval data, such as heights, weights, and incomes, are also referred to as quantitative or numerical data.
- ___ 59. Nominal data are also called qualitative or categorical data.
- ___ 60. A variable is some characteristic of a population or sample.

- ___ 61. With nominal data, there is one and only one way the possible values can be ordered.
- ___ 62. You cannot calculate and interpret differences between numbers assigned to nominal data.
- ___ 63. All calculations are permitted on interval data.
- ___ 64. Interval data may be treated as ordinal or nominal.
- ___ 65. A bar chart is used to represent interval data.
- ___ 66. One of the advantages of a pie chart is that it clearly shows that the total percentages of all the categories add to 100%.
- ___ 67. Bar and pie charts are graphical techniques for nominal data. The former focus the attention on the *frequency* of the occurrences of each category, and the later emphasizes the *proportion* of occurrences of each category.
- ___ 68. A relative frequency distribution lists the categories and their counts.
- ___ 69. A frequency distribution lists the categories and the proportion with which each occurs.
- ___ 70. From a pie chart you are able to find the frequency for each category.
- ___ 71. The intervals (classes) in a histogram do not overlap.
- ___ 72. The intervals (classes) in a histogram are equally wide.
- ___ 73. In a histogram, each observation is assigned to one or more classes.
- ___ 74. The number of class intervals in a histogram depends on the number of observations in the data set.
- ___ 75. A relative frequency distribution describes the proportion of data values that fall within each category.
- ___ 76. A stem-and-leaf display reveals more information about the original data than does a histogram.
- ___ 77. The number of observations within each class may be found in a frequency distribution.
- ___ 78. The advantage of a stem-and-leaf display over a histogram is that we can see the actual observations.
- ___ 79. According to the stem-and-leaf plot below, the median quiz score for this data set is 8.

Stem-and-leaf of Quiz Score; N = 75

Leaf Unit = 1

9	0	000112333
14	0	56899
21	1	0000123
26	1	66699
33	2	3334445
(8)	2	66677888

34	3	0023344
27	3	56669999
19	4	000122233
10	4	5556667799

___ 80. A cumulative relative frequency distribution lists the number of observations that lie below each of the class limits.

___ 81. According to the stem-and-leaf plot below, this data set has a negative median.

Stem-and-leaf of P/E ratio; N = 75

Leaf Unit = 0.01

1	-2	6
2	-2	0
5	-1	555
8	-1	420
22	-0	99999887777665
36	-0	44322111111000
(14)	0	0112223333344
25	0	66678889999
14	1	0022222334
4	1	56
2	2	03

___ 82. A histogram represents interval data.

___ 83. A stem-and-leaf display represents nominal data.

___ 84. According to the stem-and-leaf plot below, this data set is symmetric.

Stem-and-leaf of P/E ratio; N = 10

Leaf Unit = 0.10

2	-1	53
4	-0	97
(2)	-0	65
4	0	3
3	0	6
2	1	3
1	1	8

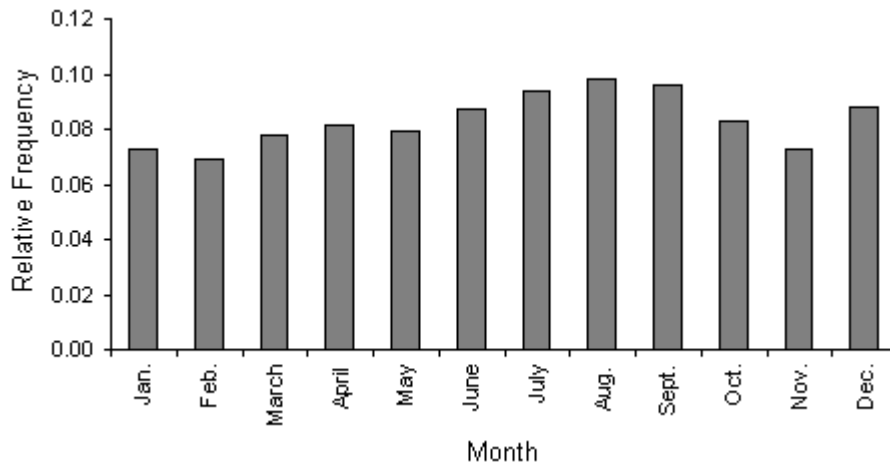
___ 85. When a distribution has more values to the left and tails off to the right, it is skewed negatively.

___ 86. A histogram is said to be symmetric if, when we draw a vertical line down the center of the histogram the two sides are nearly identical.

___ 87. A skewed histogram is one with a long tail extending either to the right or left.

___ 88. When a distribution has more values to the right and tails to the left, we say it is skewed negatively.

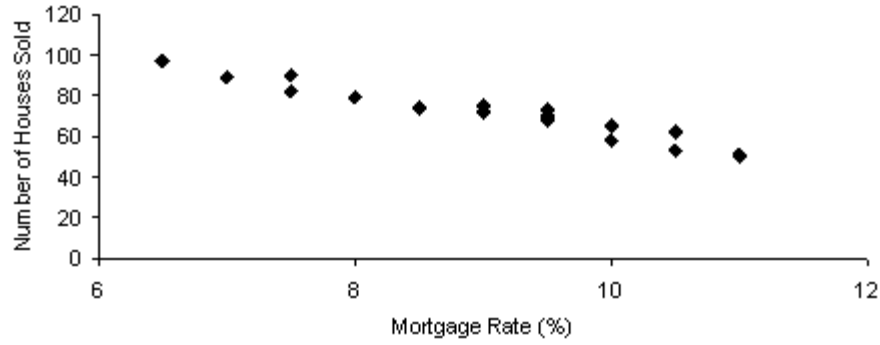
- ___ 89. The sum of relative frequencies in a distribution always equals 1.
- ___ 90. The sum of cumulative relative frequencies always equals 1.
- ___ 91. The original observations cannot be determined once they are grouped into a frequency distribution.
- ___ 92. A modal class is the class with the largest number of observations.
- ___ 93. Experience shows that few students hand in their statistics exams early; most prefer to hand them in near the end of the test period. This means the time taken by students to write exams is positively skewed.
- ___ 94. The graph below is an example of a histogram.



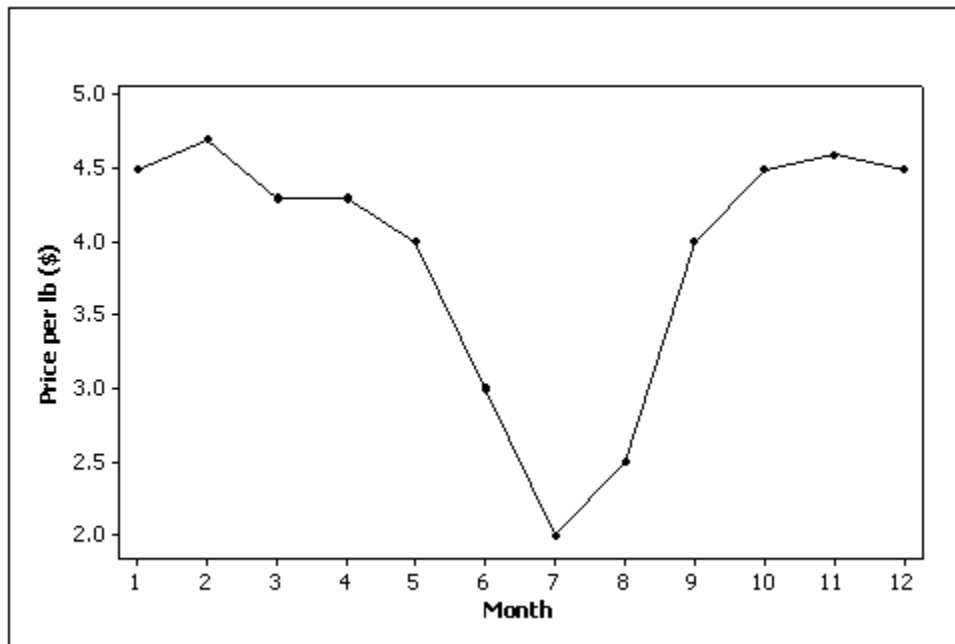
- ___ 95. A grocery store's monthly sales (in thousands of dollars) for the last year were as follows. A histogram should be used to present these data.

Month	1	2	3	4	5	6	7	8	9	10	11	12
Sales	78	74	83	87	85	93	100	105	103	89	78	94

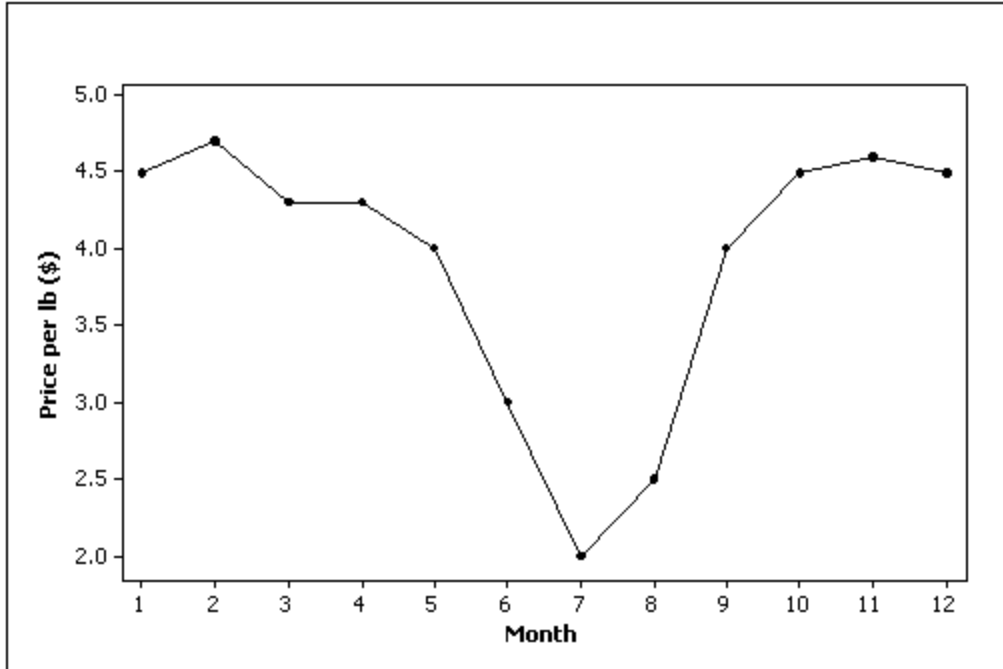
- ___ 96. Time series data are often graphically depicted on a line chart, which is a plot of the variable of interest over time.
- ___ 97. A line chart is created by plotting the values of the variable on the vertical axis and the time periods on the horizontal axis.
- ___ 98. The graph below represents a line graph.



99. The line chart below shows pepper prices each month from January (month 1) to December last year (\$ per pound). By looking at this chart you can see the lowest pepper prices occurred in July.



100. The line chart below shows pepper prices fluctuated from \$2.00 per pound to over \$4.50 per pound during the year.



- ___ 101. A line chart that is flat shows no fluctuation in the variable being presented.
- ___ 102. A cross-classification table summarizes data from two nominal variables.
- ___ 103. To describe the relationship between two nominal variables you make a scatter diagram and look for a correlation.
- ___ 104. If two nominal variables are unrelated, the patterns exhibited in their corresponding bar charts should be approximately the same. If a relationship exists, then some bar charts will differ from others.
- ___ 105. A cross-classification table is the same thing as two frequency distribution tables, one for each variable.
- ___ 106. If the relative frequencies in the rows of a cross-classification table are similar, then the two variables shown in the table are not related.
- ___ 107. If two nominal variables are unrelated, the patterns exhibited in their corresponding pie charts should be approximately the same. If a relationship exists, then some pie charts will differ from others.
- ___ 108. The percentage of observations in each combination of the cross-classification table must be equal in order to show two nominal variables are not related.
- ___ 109. In the following cross-classification table, gender and pet ownership are related.

	Own a pet	Don't own a pet
Females	60	30
Males	80	40

- ___ 110. In the following cross-classification table, gender and fantasy baseball participation are related.

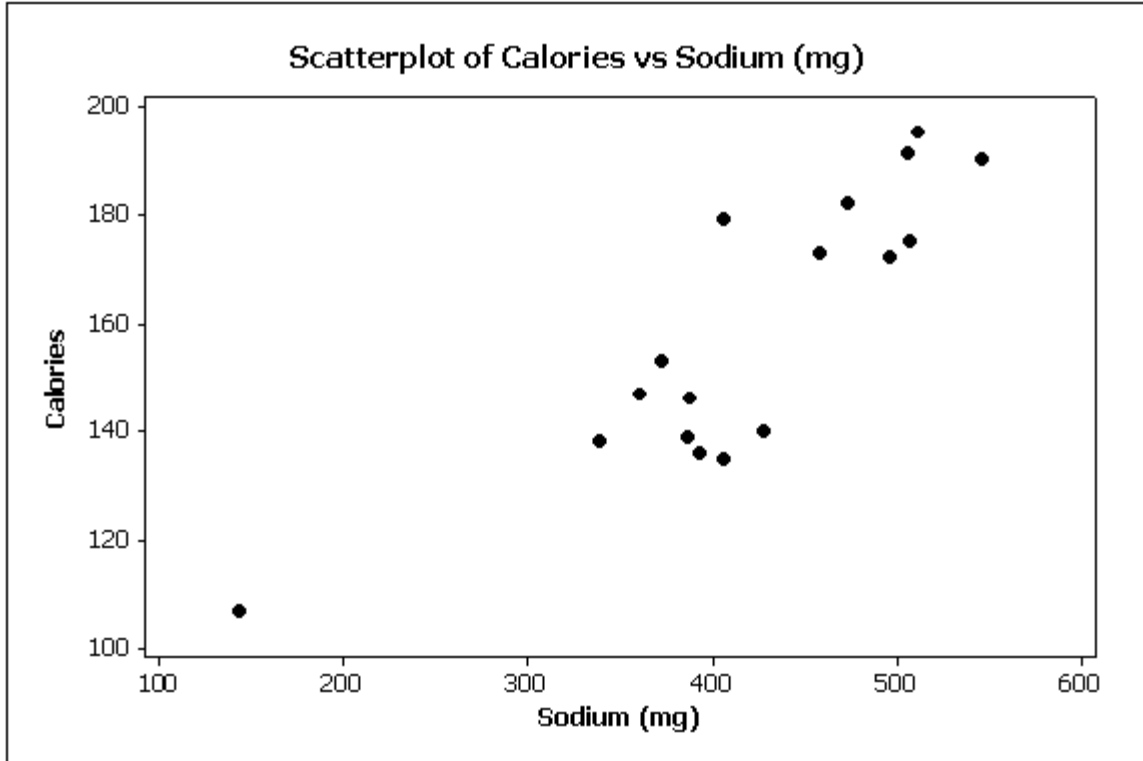
	Participate in Fantasy Baseball	Don't participate in Fantasy Baseball
Males	70	30
Females	30	70

- ___ 111. A statistics professor classifies his students according to their grade point average (GPA) and their gender. The resulting cross-classification table is shown below.

	<i>GPA</i>		
<i>Gender</i>	Under 2.0	2.0 – 3.0	Over 3.0
Male	5	25	10
Female	10	20	30

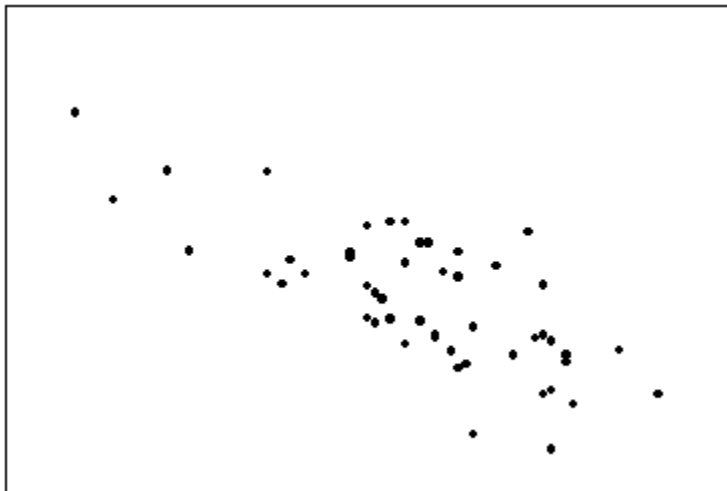
If you made a pie chart for male GPAs and a pie chart for female GPAs, those pie charts would look the same.

- ___ 112. The graphical technique used to describe the relationship between two interval variables is the scatter diagram.
- ___ 113. The two most important characteristics revealed by the scatter diagram are the strength and direction of the linear relationship.
- ___ 114. If we draw a straight line through the points in a scatter diagram and most of the points fall close to the line, there must be a positive relationship between the two variables.
- ___ 115. When two variables are linearly related, and tend to move in opposite directions, we describe the nature of their association as a negative linear relationship.
- ___ 116. Data for calories and salt content (milligrams of sodium) in 17 brands of meat hot dogs are shown in the scatter diagram below. According to this diagram, it appears that hot dogs that are high in sodium are generally low in calories, and hot dogs with low sodium are generally high in calories.

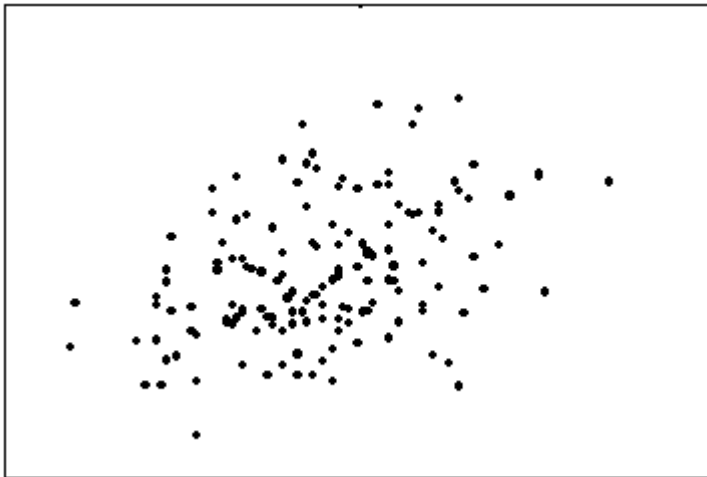
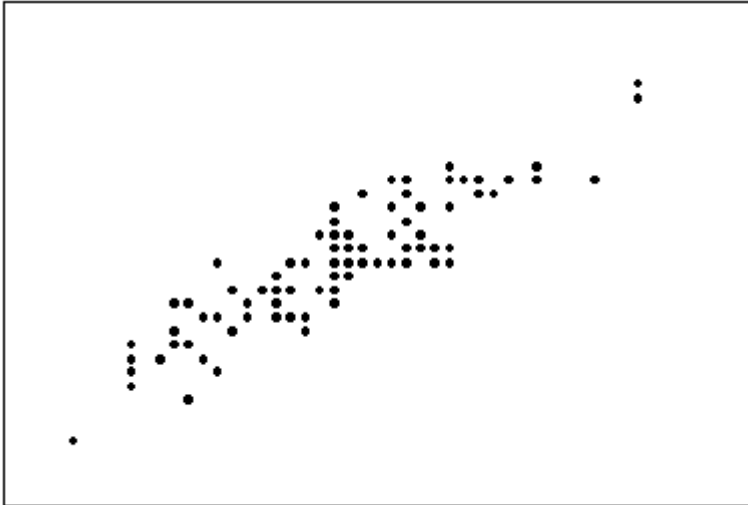


___ 117. The two most important characteristics to examine in a scatter diagram are the number of possible categories for X and Y and the number of observations in each category.

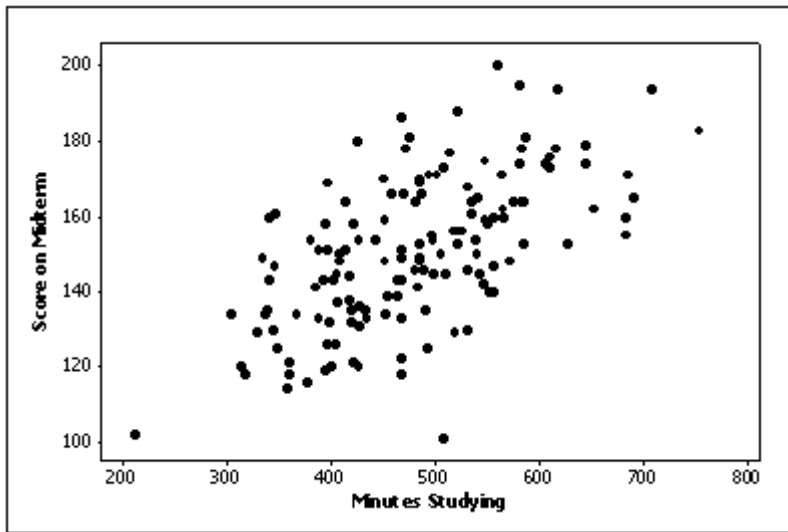
___ 118. The scatter diagram below depicts data with a negative linear relationship.



___ 119. The first scatter diagram below shows a stronger linear relationship than the second scatter diagram. (Assume the scales on both scatter diagrams are the same.)



- ___ 120. If two variables have a strong linear relationship, that means one variable is *causing* the other variable to go up or down.
- ___ 121. Correlation implies causation.
- ___ 122. A professor examines the relationship between minutes studying and exam score (out of 200 points) for a random sample of his students. The scatter diagram is shown below. It appears that study time has somewhat of a positive linear relationship with exam score.

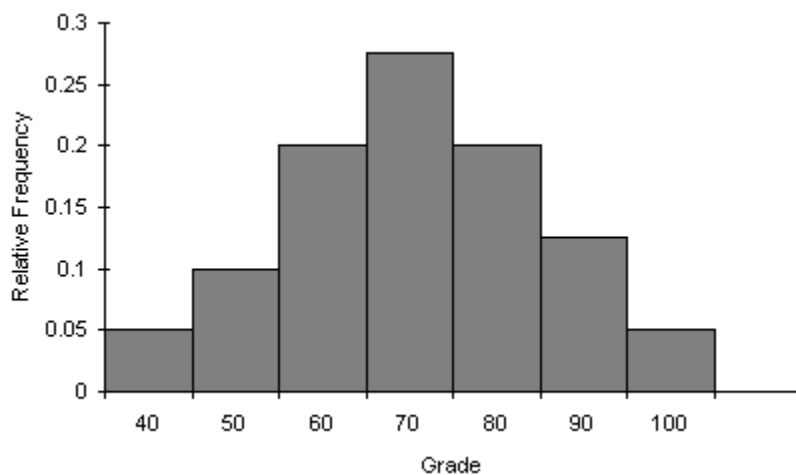


Completion

Complete each statement.

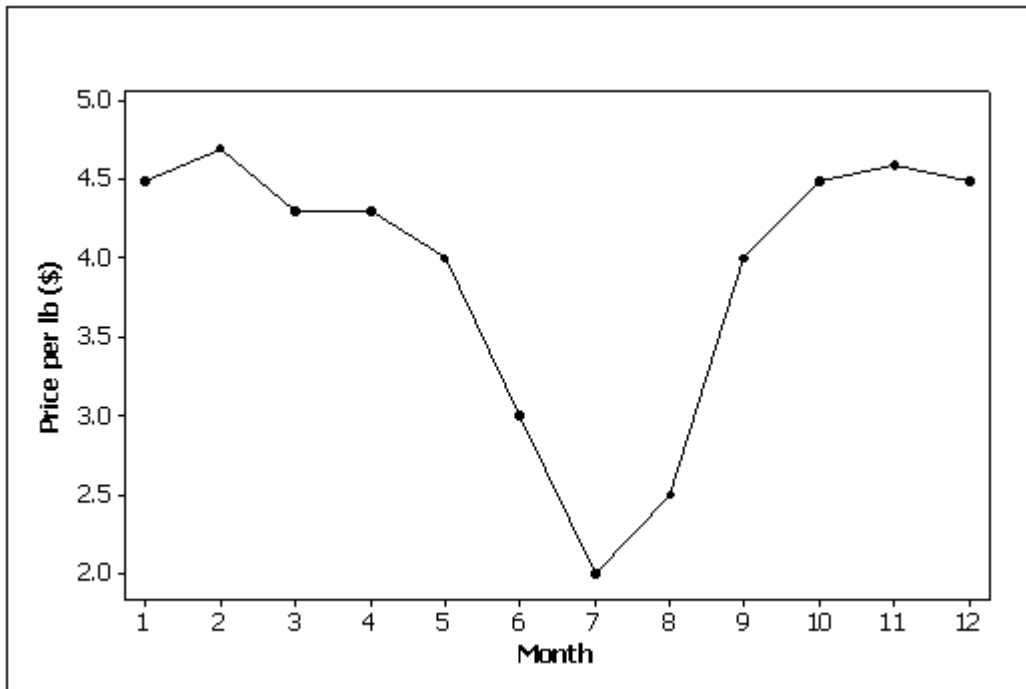
123. The Dean of Students conducted a survey of students on campus. A student's SAT score in mathematics is an example of a(n) _____ variable.
124. The Dean of Students conducted a survey on campus. The gender of each student is an example of a(n) _____ variable.
125. The Dean of Students conducted a survey on campus. Class rank (Freshman, Sophomore, Junior, and Senior) is an example of a(n) _____ variable.
126. The final grade received in an English course (A, B, C, D, or F) is an example of a(n) _____ variable.
127. In purchasing a used automobile, there are a number of variables to consider. The age of the car is an example of a(n) _____ variable.
128. In purchasing an automobile, there are a number of variables to consider. The body style of the car (sedan, coupe, wagon, etc.) is an example of a(n) _____ variable.
129. Two types of graphs that organize nominal data are _____ and _____.
130. A bar chart is used to represent _____ data.
131. A pie chart is used to represent _____ data.
132. A(n) _____ chart is often used to display frequencies; a(n) _____ chart graphically shows relative frequencies.
133. A pie chart shows the _____ of individuals that fall into each category.

134. We can summarize nominal data in a table that presents the categories and their counts. This table is called a(n) _____ distribution.
135. A(n) _____ distribution lists the categories of a nominal variable and the proportion with which each occurs.
136. A(n) _____ chart is not able to show frequencies. It can only show relative frequencies.
137. In a pie chart, each slice is proportional to the _____ of individuals in that category.
138. A category in a pie chart that contains 25% of the observations is represented by a slice of the pie that is equal to _____ degrees.
139. We create a frequency distribution for interval data by counting the number of observations that fall into each of a series of intervals, called _____.
140. The more observations we have, the _____ the number of class intervals we need to use to draw a useful histogram.
141. A graph of the frequency distribution for interval data is called a(n) _____.
142. We determine the approximate width of the classes of a histogram by subtracting the smallest observation from the largest and dividing the answer by the number of _____.
143. A histogram is said to be _____ if, when we draw a vertical line down the center of the histogram, the two sides are identical in shape and size.
144. A(n) _____ histogram is one with a long tail extending to either the right or the left.
145. The histogram below has a shape that is _____.



146. It is typical that when taking an exam, few students hand in their exams early; most prefer to reread their papers and hand them in near the end of the scheduled exam period. Under this scenario, a histogram of exam taking times is _____ skewed.

147. In a histogram a(n) _____ class is the one with the largest number of observations.
148. A(n) _____ histogram has two peaks, not necessarily equal in height.
149. The length of each line in a step-and-leaf display represents the _____ of that class interval defined by the stems.
150. A(n) _____ is a graphical representation of the cumulative relative frequencies.
151. The largest value of a cumulative relative frequency is _____.
152. A(n) _____ display shows the actual observations as well as the number of observations in each class.
153. A(n) _____ is a table that sorts data into class intervals (categories) and gives the number of observations in each interval (category).
154. The line chart below shows pepper prices per pound for each month from January (month 1) to December last year. By looking at this chart you can see the lowest pepper prices occurred in _____.



155. Observations that are measured at the same time are called _____ data.
156. Observations that are taken during successive points in time are called _____ data.
157. Time series data are often graphically depicted on a(n) _____, which is a plot of the variable of interest over time.

158. A(n) _____ is created by plotting the value of the variable on the vertical axis and the time periods on the horizontal axis.
159. A line chart is created by plotting the value of the variable on the _____ axis and the time periods on the _____ axis.
160. To evaluate two nominal variables at the same time, a(n) _____ table should be created from the data.
161. Data that contains information on two variables is called _____ data.
162. A cross-classification table is used to describe the relationship between two _____ variables.
163. Data that contains information on a single variable is called _____ data.
164. You can graph the relationship between two nominal variables using two _____ or two _____.
165. If two pie charts made from the rows of a cross-classification table look the same, then the two nominal variables _____ (are/are not) related.
166. If two bar charts made from the rows of a cross-classification table look the same, then the two nominal variables _____ (are/are not) related.
167. In applications involving two variables, X and Y , where one variable depends to some degree on the other, we call Y the _____ variable.
168. In applications involving two variables, X and Y , where one variable depends to some degree on the other, we call X the _____ variable.
169. A(n) _____ is a graphical display consisting of a set of points, each point representing one variable measured along the horizontal axis, and another variable measured along the vertical axis.
170. If when one variable increases the other one also increases, we say that there is a(n) _____ relationship between these two variables.
171. When one variable increases and the other decreases, we say that there is a(n) _____ relationship between these two variables.
172. An individual's income depends somewhat on their number of years of education. Accordingly, we identify income as the _____ variable, and years of education as the _____ variable.
173. One of the variables used to help predict unemployment rates is the rate of inflation. Accordingly, we identify rate of inflation as the _____ variable, and unemployment rate as the _____ variable.

174. The two most important characteristics to look for in a scatter diagram are the _____ and _____ of the linear relationship.

Short Answer

175. At the end of a tour vacation, the travel agent asks the vacationers to respond to the questions listed below. For each question, determine whether the possible responses are interval, nominal, or ordinal.
- How many tour vacations have you taken prior to this one?
 - Do you feel that your tour vacation lasted sufficiently long (yes/no)?
 - Which of the following features of the hotel accommodations did you find most attractive: location, facilities, room size, service, or price?
 - What is the maximum number of hours per day that you would like to spend traveling?
 - Is your overall rating of this tour: excellent, good, fair, or poor?
176. Before leaving a particular restaurant, customers are asked to respond to the questions listed below. For each question, determine whether the possible responses are interval, nominal, or ordinal.
- What is the approximate distance (in miles) between this restaurant and your residence?
 - Have you ever eaten at this restaurant before?
 - On how many occasions have you eaten at the restaurant before?
 - Which of the following attributes of this restaurant do you find most attractive: service, prices, quality of the food, or the menu?
 - What is your overall rating of the restaurant: excellent, good, fair, or poor?
177. For each of the following examples, identify the data type as nominal, ordinal, or interval.
- The final grade received by a student in a computer science class.
 - The number of students in a statistics course.
 - The starting salary of an MBA graduate.
 - The size of an order of fries (small, medium, large, super-size) purchased by a McDonald's customer.
 - The college you are enrolled in (Arts and Sciences, Business, Education, etc.).
178. For each of the following, indicate whether the variable of interest is nominal or interval.
- Whether you are a U.S. citizen.
 - Your marital status.
 - The number of cars parked in a certain parking lot at any given time.
 - The amount of time you spent last week on your homework.
 - Lily's travel time from her dorm to the student union on campus.
 - Heidi's favorite brand of tennis balls.
179. Provide one example of nominal data; one example of ordinal data; and one example of interval data.
180. Explain why political affiliation is not an ordinal variable.
181. Explain the difference between ordinal data and interval data.

182. Give an example of interval data that can also be treated as ordinal data and nominal data.
183. Identify the type of data for which each of the following graphs is appropriate.
- Pie chart
 - Bar chart
184. Twenty-five voters participating in a recent election exit poll in Minnesota were asked to state their political party affiliation. Coding the data as 1 for Republican, 2 for Democrat, and 3 for Independent, the data collected were as follows: 3, 1, 2, 3, 1, 3, 3, 2, 1, 3, 3, 2, 1, 1, 3, 2, 3, 1, 3, 2, 3, 2, 1, 1, and 3. Construct a frequency bar chart from this data. What does the bar chart tell you about the political affiliations of those in this sample?

Car Buyers

Forty car buyers were asked to indicate which car dealer offered the best overall service. The four choices were Carriage Motors (C), Marco Chrysler (M), Triangle Auto (T), and University Chevrolet (U). The following data were obtained:

T C C C U C M T C U
 U M C M T C M M C M
 T C C T U M M C C T
 T U C U T M M C U T

185. {Car Buyers Narrative} Construct a frequency bar chart of this data. Which car dealer came in last place in terms of overall service?
186. {Car Buyers Narrative} Construct a pie chart of this data. Which car dealer offered the best overall service?
187. Suppose you measure the number of minutes it takes an employee to complete a task, where the maximum allowed time is 5 minutes, and each time is rounded to the nearest minute. Data from 130 employees is summarized below. Construct a frequency bar chart and a pie chart from this data. How long did it take most employees to complete the task?

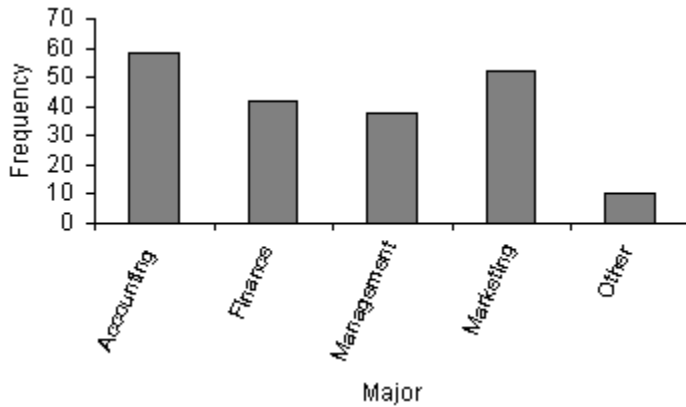
Time (minutes)	1	2	3	4	5
Frequency	15	30	40	25	20

Business School Graduates

A sample of business school graduates were asked what their major was. The results are shown in the following frequency distribution.

Major of Graduates	Number of graduates
Accounting	58
Finance	42
Management	38
Marketing	52
Other	10

188. {Business School Graduates Narrative} How many graduates were surveyed?
189. {Business School Graduates Narrative} Draw a pie chart to summarize this data. Which major was the most popular?
190. {Business School Graduates Narrative} If you were only given the frequency bar chart below, would you be able to reconstruct the original observations in the data set?



191. {Business School Graduates Narrative} Draw a pie chart of this data. Are you able to reconstruct the original data from this pie chart alone?
192. For what type of data is a histogram appropriate?
193. Twenty-five voters participating in a recent election exit poll in Minnesota 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: 3, 1, 2, 3, 1, 3, 3, 2, 1, 3, 3, 2, 1, 1, 3, 2, 3, 1, 3, 2, 3, 2, 1, 1, and 3. Develop a frequency distribution and a relative frequency distribution for this data. What does the data suggest about the strength of the political parties in Minnesota?

Salesperson Ages

The ages (in years) of a sample of 25 salespersons are as follows:

47	21	37	53	28
40	30	32	34	26
34	24	24	35	45
38	35	28	43	45
30	45	31	41	56

194. {Salesperson Ages Narrative} Draw a frequency histogram of this data which contains four classes. What is the shape of the histogram?
195. {Salesperson Ages Narrative} Draw a frequency histogram of this data which contains six classes. What is the shape of the histogram?

196. {Salespersons' Ages Narrative} Draw a stem-and-leaf display of this data. What is the minimum and maximum age of the salespersons in this data set?
197. {Salesperson's Ages Narrative} Construct an ogive for this data. Estimate the proportion of salespersons that are: 1) under 30 years of age; 2) 40 years of age or over; and 3) between 40 and 50 years of age.

Exam scores

The scores on a calculus exam for a random sample of 40 students are as follows:

63 74 42 65 51 54 36 56 68 57
 62 64 76 67 79 61 81 77 59 38
 84 68 71 94 71 86 69 75 91 55
 48 82 83 54 79 62 68 58 41 47

198. {Exam Grades Narrative} Construct a stem-and-leaf display for this data set. Describe the shape of the data.
199. {Exam Grades Narrative} Construct frequency and relative frequency distributions for this data set using seven class intervals. Describe the shape of the data set.
200. {Exam Grade Narrative} Construct a relative frequency histogram for this data set and discuss its shape.
201. {Exam Grades Narrative} Describe the distribution of exam scores.
202. {Exam Grades Narrative} Construct a cumulative frequency and a cumulative relative frequency distribution for this data. What proportion of the exam scores are less than 60? What proportion of the exam scores are 70 or more?
203. {Exam Grades Narrative} Construct an ogive for this data set. Use the ogive to estimate the proportion of exam scores that are between 80 and 90.
204. Forty car buyers were asked to indicate the car dealer they believed offered the best overall service. The four choices were A, B, C, and D as shown below:

A C C C D C B A C D
 D B C B A C B B C B
 A C C A D B B C C A
 A D C D A B B C D A

Construct a table showing the frequencies and relative frequencies for this data set. What proportion of car buyers rated dealer D as the best?

205. A grocery store's monthly sales (in thousands of dollars) for the last year were as follows:

Month	1	2	3	4	5	6	7	8	9	10	11	12
Sales	78	74	83	87	85	93	100	105	103	89	78	94

Construct a relative frequency bar chart for this data set. How many observations are there in this data set?

206. Consider the following cumulative frequency distribution.

Classes Limits	Cumulative Frequency	Frequency
< 5	8	
< 10	15	
< 15	21	
< 20	30	
< 25	42	

Fill in the frequencies for each class in the above table.

207. The weights of a sample of 25 workers are given (in pounds): 164, 148, 137, 157, 173, 156, 177, 172, 169, 165, 145, 168, 163, 162, 174, 152, 156, 168, 154, 151, 174, 146, 134, 140, and 171. Construct an ogive for the data. What proportion of the worker's weights are between 160 and 180 pounds; below 150 pounds; and at or above 140 pounds, respectively?

Insurance Company

A representative from a local insurance agency selected a random sample of insured drivers and recorded the number of claims made in the last three years, with the following results:

Number of claims	0	1	2	3	4	5
Frequency	10	18	16	12	3	1

208. {Insurance Company Narrative} How many drivers are represented in the sample?

209. {Insurance Company Narrative} How many total claims are represented in the sample?

210. {Insurance Company Narrative} What proportion of drivers had no claims in the last three years?

211. {Insurance Company Narrative} What number of claims was made by the highest proportion of drivers?

Computer Company

At a meeting of regional offices managers of a national computer company, a survey was taken to determine the number of employees the regional managers supervise in the operation of their departments. The results of the survey are shown below.

Number of employees supervised	1	2	3	4	5
Frequency	7	11	14	8	10

212. {Computer Company Narrative} How many regional offices are represented in the survey results?

213. {Computer Company Narrative} Across all of the regional offices, how many total employees were supervised by those surveyed?

214. {Computer Company Narrative} What proportion of managers supervise 3 employees?

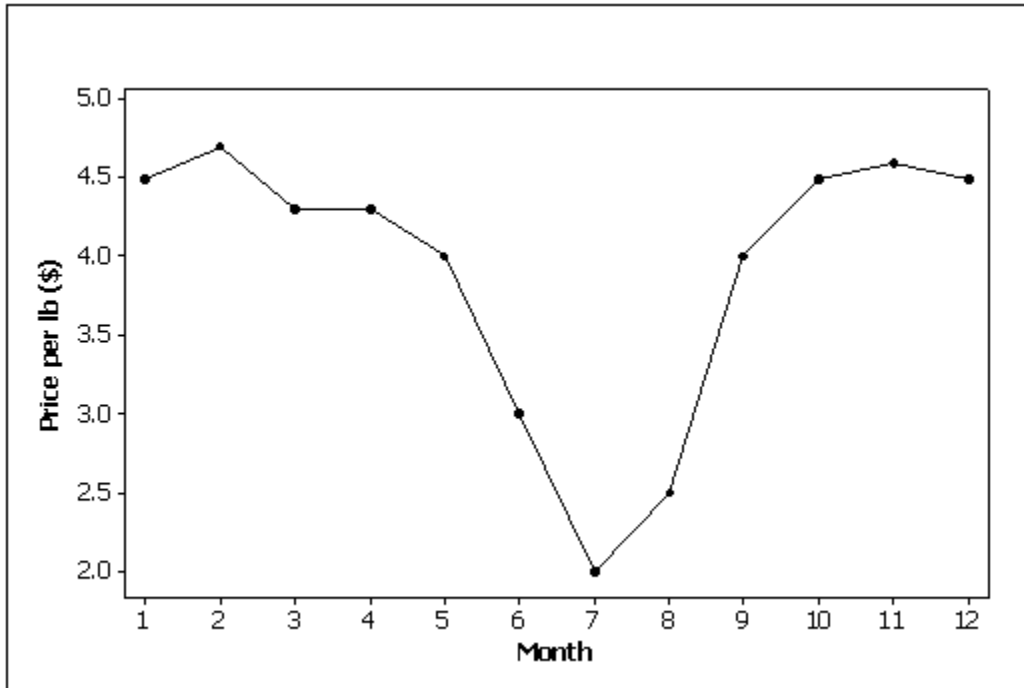
215. {Computer Company Narrative} What is the cumulative relative frequency corresponding to 5 employees?

On-line Classes

A survey of 25 students was conducted to determine how they rate the quality of on-line classes. Students were asked to rate the overall quality from 0 (no quality at all) to 100 (extremely good quality). The stem-and-leaf display of the data is shown below.

Stem	Leaves
3	15
4	01457889
5	0134677
6	24568
7	29
8	
9	5

216. {On-line Classes Narrative} What percentage of the students rated the overall quality of on-line classes as being 70 or above?
217. {On-line Classes Narrative} What percentage of the students rated the overall quality of on-line classes as being 60 or below?
218. {On-line Classes Narrative} What percentage of the students rated the overall quality of on-line classes as being between 50 and 75, inclusive?
219. {On-line Classes Narrative} What percentage of the students rated the overall quality of on-line classes as being below 40?
220. Briefly discuss the difference between cross-sectional data and time-series data.
221. Explain the difference between a histogram and a line chart.
222. Pepper prices throughout the year (month 1 = January) are shown in the line chart below (per pound). Describe pepper prices for this given year using this line chart.



All-Nighters

A sample of 200 students at a certain university was taken after the midterm; one hundred students reported staying up all night before the midterm and the other one hundred students did not. Researchers recorded whether each student did well or poorly on the midterm. The following table contains the results.

	Did Well on Midterm	Did Poorly on Midterm
Stayed up all night	30	70
Did not stay up all night	60	40

223. {All-Nighter Narrative} Of those who stayed up all night before the midterm, what percentage did well on the midterm?
224. {All-Nighters Narrative} Of those who did well on the midterm, what percentage stayed up all night before the midterm?
225. {All-Nighters Narrative} Briefly explain (using percentages) whether staying up all night before this midterm is related to a student doing poorly.
226. {All-Nighters Narrative} There is a relationship between whether or not a student stayed up all night before the midterm, and how well they did on the midterm. Describe this relationship using percentages.
227. Using the following cross-classification table, draw two pie charts that compare pet ownership for males vs. females. Are gender and pet ownership related?

	Own a pet	Don't own a pet
Females	75	25

Males	40	60
-------	----	----

228. Using the following cross-classification table, draw two bar charts that compare pet ownership for males vs. females. Are gender and pet ownership related?

	Own a pet	Don't own a pet
Females	75	25
Males	40	60

229. A professor of economics wants to study the relationship between income and education. A sample of 10 individuals is selected at random, and their income (in thousands of dollars) and education (in years) are shown below:

Education	12	14	10	11	13	8	10	15	13	12
Income	25	31	20	24	28	15	21	35	29	27

- Draw a scatter diagram for these data with the income on the vertical axis.
 - Describe the relationship between income and education.
230. The number of houses sold in Grand Rapids and the average monthly mortgage rates for 18 months randomly selected between January 1997 and April 1999 are shown in the following table.

Mortgage rate (%)	Number of houses sold	Mortgage rate (%)	Number of houses sold
7.5	90	9.5	68
9.0	72	6.5	97
7.0	89	8.0	79
10.5	62	9.0	75
10.0	58	10.5	53
9.5	70	9.5	73
8.5	74	11.0	50
10.0	65	7.5	82
11.0	51	8.5	70

- Draw a scatter diagram with the number of houses sold on the vertical axis.
 - Describe the relationship between mortgage rate and number of houses sold.
231. Briefly explain the difference between correlation and causation in terms of a relationship between X and Y .
232. It is speculated that the number of police officers has a negative linear relationship with number of crimes. Explain why this might be so.
233. What are the two most important characteristics to look for in a scatter diagram?
234. Can a scatter diagram be used to explore the relationship between two nominal variables? Explain why or why not.

Ch2

Answer Section

MULTIPLE CHOICE

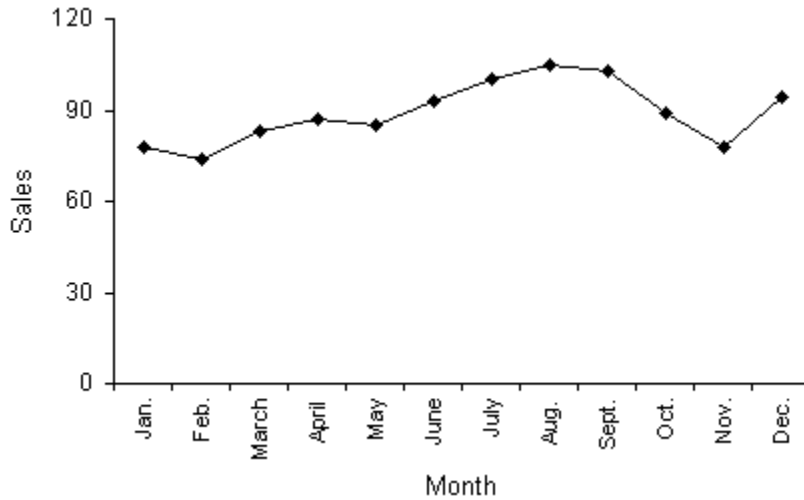
- | | | |
|------------|--------|------------------|
| 1. ANS: A | PTS: 1 | REF: SECTION 2.1 |
| 2. ANS: C | PTS: 1 | REF: SECTION 2.1 |
| 3. ANS: A | PTS: 1 | REF: SECTION 2.1 |
| 4. ANS: A | PTS: 1 | REF: SECTION 2.1 |
| 5. ANS: C | PTS: 1 | REF: SECTION 2.1 |
| 6. ANS: B | PTS: 1 | REF: SECTION 2.1 |
| 7. ANS: B | PTS: 1 | REF: SECTION 2.1 |
| 8. ANS: B | PTS: 1 | REF: SECTION 2.2 |
| 9. ANS: B | PTS: 1 | REF: SECTION 2.2 |
| 10. ANS: D | PTS: 1 | REF: SECTION 2.2 |
| 11. ANS: B | PTS: 1 | REF: SECTION 2.2 |
| 12. ANS: B | PTS: 1 | REF: SECTION 2.2 |
| 13. ANS: B | PTS: 1 | REF: SECTION 2.3 |
| 14. ANS: D | PTS: 1 | REF: SECTION 2.3 |
| 15. ANS: D | PTS: 1 | REF: SECTION 2.3 |
| 16. ANS: C | PTS: 1 | REF: SECTION 2.3 |
| 17. ANS: C | PTS: 1 | REF: SECTION 2.3 |
| 18. ANS: A | PTS: 1 | REF: SECTION 2.3 |
| 19. ANS: C | PTS: 1 | REF: SECTION 2.3 |
| 20. ANS: A | PTS: 1 | REF: SECTION 2.3 |
| 21. ANS: A | PTS: 1 | REF: SECTION 2.3 |
| 22. ANS: D | PTS: 1 | REF: SECTION 2.3 |
| 23. ANS: D | PTS: 1 | REF: SECTION 2.3 |
| 24. ANS: B | PTS: 1 | REF: SECTION 2.3 |
| 25. ANS: D | PTS: 1 | REF: SECTION 2.3 |
| 26. ANS: B | PTS: 1 | REF: SECTION 2.3 |
| 27. ANS: D | PTS: 1 | REF: SECTION 2.3 |
| 28. ANS: D | PTS: 1 | REF: SECTION 2.3 |
| 29. ANS: A | PTS: 1 | REF: SECTION 2.4 |
| 30. ANS: B | PTS: 1 | REF: SECTION 2.4 |
| 31. ANS: C | PTS: 1 | REF: SECTION 2.4 |
| 32. ANS: C | PTS: 1 | REF: SECTION 2.4 |
| 33. ANS: D | PTS: 1 | REF: SECTION 2.4 |
| 34. ANS: A | PTS: 1 | REF: SECTION 2.4 |
| 35. ANS: D | PTS: 1 | REF: SECTION 2.4 |
| 36. ANS: D | PTS: 1 | REF: SECTION 2.4 |
| 37. ANS: A | PTS: 1 | REF: SECTION 2.5 |
| 38. ANS: D | PTS: 1 | REF: SECTION 2.5 |
| 39. ANS: A | PTS: 1 | REF: SECTION 2.5 |
| 40. ANS: C | PTS: 1 | REF: SECTION 2.5 |

41.	ANS: D	PTS: 1	REF: SECTION 2.5
42.	ANS: D	PTS: 1	REF: SECTION 2.5
43.	ANS: B	PTS: 1	REF: SECTION 2.5
44.	ANS: A	PTS: 1	REF: SECTION 2.6
45.	ANS: B	PTS: 1	REF: SECTION 2.6
46.	ANS: B	PTS: 1	REF: SECTION 2.6
47.	ANS: D	PTS: 1	REF: SECTION 2.6
48.	ANS: A	PTS: 1	REF: SECTION 2.6
49.	ANS: B	PTS: 1	REF: SECTION 2.6
50.	ANS: B	PTS: 1	REF: SECTION 2.6
51.	ANS: B	PTS: 1	REF: SECTION 2.6

TRUE/FALSE

52.	ANS: T	PTS: 1	REF: SECTION 2.1
53.	ANS: F	PTS: 1	REF: SECTION 2.1
54.	ANS: T	PTS: 1	REF: SECTION 2.1
55.	ANS: F	PTS: 1	REF: SECTION 2.1
56.	ANS: T	PTS: 1	REF: SECTION 2.1
57.	ANS: F	PTS: 1	REF: SECTION 2.1
58.	ANS: T	PTS: 1	REF: SECTION 2.1
59.	ANS: T	PTS: 1	REF: SECTION 2.1
60.	ANS: T	PTS: 1	REF: SECTION 2.1
61.	ANS: F	PTS: 1	REF: SECTION 2.1
62.	ANS: T	PTS: 1	REF: SECTION 2.1
63.	ANS: T	PTS: 1	REF: SECTION 2.1
64.	ANS: T	PTS: 1	REF: SECTION 2.1
65.	ANS: F	PTS: 1	REF: SECTION 2.2
66.	ANS: T	PTS: 1	REF: SECTION 2.2
67.	ANS: T	PTS: 1	REF: SECTION 2.2
68.	ANS: F	PTS: 1	REF: SECTION 2.2
69.	ANS: F	PTS: 1	REF: SECTION 2.2
70.	ANS: F	PTS: 1	REF: SECTION 2.2
71.	ANS: T	PTS: 1	REF: SECTION 2.3
72.	ANS: T	PTS: 1	REF: SECTION 2.3
73.	ANS: F	PTS: 1	REF: SECTION 2.3
74.	ANS: T	PTS: 1	REF: SECTION 2.3
75.	ANS: T	PTS: 1	REF: SECTION 2.3
76.	ANS: T	PTS: 1	REF: SECTION 2.3
77.	ANS: T	PTS: 1	REF: SECTION 2.3
78.	ANS: T	PTS: 1	REF: SECTION 2.3
79.	ANS: F	PTS: 1	REF: SECTION 2.3
80.	ANS: F	PTS: 1	REF: SECTION 2.3
81.	ANS: F	PTS: 1	REF: SECTION 2.3
82.	ANS: T	PTS: 1	REF: SECTION 2.3
83.	ANS: F	PTS: 1	REF: SECTION 2.3

- 84. ANS: F PTS: 1 REF: SECTION 2.3
- 85. ANS: F PTS: 1 REF: SECTION 2.3
- 86. ANS: T PTS: 1 REF: SECTION 2.3
- 87. ANS: F PTS: 1 REF: SECTION 2.3
- 88. ANS: T PTS: 1 REF: SECTION 2.3
- 89. ANS: T PTS: 1 REF: SECTION 2.3
- 90. ANS: F PTS: 1 REF: SECTION 2.3
- 91. ANS: T PTS: 1 REF: SECTION 2.3
- 92. ANS: T PTS: 1 REF: SECTION 2.3
- 93. ANS: F PTS: 1 REF: SECTION 2.3
- 94. ANS: F PTS: 1 REF: SECTION 2.3
- 95. ANS: F



- PTS: 1 REF: SECTION 2.4
- 96. ANS: T PTS: 1 REF: SECTION 2.4
- 97. ANS: T PTS: 1 REF: SECTION 2.4
- 98. ANS: F PTS: 1 REF: SECTION 2.4
- 99. ANS: T PTS: 1 REF: SECTION 2.4
- 100. ANS: T PTS: 1 REF: SECTION 2.4
- 101. ANS: T PTS: 1 REF: SECTION 2.4
- 102. ANS: T PTS: 1 REF: SECTION 2.5
- 103. ANS: F PTS: 1 REF: SECTION 2.5
- 104. ANS: T PTS: 1 REF: SECTION 2.5
- 105. ANS: F PTS: 1 REF: SECTION 2.5
- 106. ANS: T PTS: 1 REF: SECTION 2.5
- 107. ANS: T PTS: 1 REF: SECTION 2.5
- 108. ANS: F PTS: 1 REF: SECTION 2.5
- 109. ANS: F PTS: 1 REF: SECTION 2.5
- 110. ANS: T PTS: 1 REF: SECTION 2.5
- 111. ANS: F PTS: 1 REF: SECTION 2.5
- 112. ANS: T PTS: 1 REF: SECTION 2.6
- 113. ANS: T PTS: 1 REF: SECTION 2.6
- 114. ANS: F PTS: 1 REF: SECTION 2.6

- | | | | |
|------|--------|--------|------------------|
| 115. | ANS: T | PTS: 1 | REF: SECTION 2.6 |
| 116. | ANS: F | PTS: 1 | REF: SECTION 2.6 |
| 117. | ANS: F | PTS: 1 | REF: SECTION 2.6 |
| 118. | ANS: T | PTS: 1 | REF: SECTION 2.6 |
| 119. | ANS: T | PTS: 1 | REF: SECTION 2.6 |
| 120. | ANS: F | PTS: 1 | REF: SECTION 2.6 |
| 121. | ANS: F | PTS: 1 | REF: SECTION 2.6 |
| 122. | ANS: T | PTS: 1 | REF: SECTION 2.6 |

COMPLETION

- | | | | |
|------|--|--------|------------------|
| 123. | ANS:
interval
quantitative
numerical | PTS: 1 | REF: SECTION 2.1 |
| 124. | ANS:
nominal
categorical
qualitative | PTS: 1 | REF: SECTION 2.1 |
| 125. | ANS: ordinal | PTS: 1 | REF: SECTION 2.1 |
| 126. | ANS:
nominal
categorical
qualitative | PTS: 1 | REF: SECTION 2.1 |
| 127. | ANS:
interval
quantitative
numerical | PTS: 1 | REF: SECTION 2.1 |
| 128. | ANS:
nominal
categorical
qualitative | PTS: 1 | REF: SECTION 2.1 |
| 129. | ANS:
pie charts; bar charts
bar charts; pie charts | PTS: 1 | REF: SECTION 2.2 |

130. ANS:
nominal
categorical
qualitative
- PTS: 1 REF: SECTION 2.2
131. ANS:
nominal
categorical
qualitative
- PTS: 1 REF: SECTION 2.2
132. ANS: bar; pie
- PTS: 1 REF: SECTION 2.2
133. ANS:
percentage
relative frequency
proportion
- PTS: 1 REF: SECTION 2.2
134. ANS: frequency
- PTS: 1 REF: SECTION 2.2
135. ANS: relative frequency
- PTS: 1 REF: SECTION 2.2
136. ANS: pie
- PTS: 1 REF: SECTION 2.2
137. ANS:
percentage
proportion
relative frequency
- PTS: 1 REF: SECTION 2.2
138. ANS: 90
- PTS: 1 REF: SECTION 2.2
139. ANS: classes
- PTS: 1 REF: SECTION 2.3
140. ANS:
larger
higher
greater
- PTS: 1 REF: SECTION 2.3
141. ANS: histogram

142. PTS: 1 REF: SECTION 2.3
ANS: classes
intervals
143. PTS: 1 REF: SECTION 2.3
ANS: symmetric
symmetrical
144. PTS: 1 REF: SECTION 2.3
ANS: skewed
145. PTS: 1 REF: SECTION 2.3
ANS: symmetric
symmetrical
bell shaped
bell-shaped
146. PTS: 1 REF: SECTION 2.3
ANS: negatively
147. PTS: 1 REF: SECTION 2.3
ANS: modal
148. PTS: 1 REF: SECTION 2.3
ANS: bimodal
149. PTS: 1 REF: SECTION 2.3
ANS: frequency
count
150. PTS: 1 REF: SECTION 2.3
ANS: ogive
151. PTS: 1 REF: SECTION 2.3
ANS: one
1
152. PTS: 1 REF: SECTION 2.3
ANS: stem-and-leaf
stem and leaf
153. PTS: 1 REF: SECTION 2.3
ANS: frequency distribution

154. PTS: 1 REF: SECTION 2.3
ANS: July
155. PTS: 1 REF: SECTION 2.4
ANS:
cross-sectional
cross sectional
156. PTS: 1 REF: SECTION 2.4
ANS:
time-series
time series
157. PTS: 1 REF: SECTION 2.4
ANS: line chart
158. PTS: 1 REF: SECTION 2.4
ANS: line chart
159. PTS: 1 REF: SECTION 2.4
ANS:
vertical; horizontal
Y; X
160. PTS: 1 REF: SECTION 2.4
ANS:
cross-classification
cross-tabulation
contingency
161. PTS: 1 REF: SECTION 2.5
ANS: bivariate
162. PTS: 1 REF: SECTION 2.5
ANS:
nominal
categorical
qualitative
163. PTS: 1 REF: SECTION 2.5
ANS: univariate
164. PTS: 1 REF: SECTION 2.5
ANS:
bar charts; pie charts
pie charts; bar charts
165. PTS: 1 REF: SECTION 2.5
ANS: are not

PTS: 1 REF: SECTION 2.5
166. ANS: are not

PTS: 1 REF: SECTION 2.5
167. ANS: dependent

PTS: 1 REF: SECTION 2.6
168. ANS: independent

PTS: 1 REF: SECTION 2.6
169. ANS: scatter diagram

PTS: 1 REF: SECTION 2.6
170. ANS:
positive
uphill

PTS: 1 REF: SECTION 2.6
171. ANS:
negative
downhill

PTS: 1 REF: SECTION 2.6
172. ANS:
dependent; independent
Y; X

PTS: 1 REF: SECTION 2.6
173. ANS:
independent; dependent
X; Y

PTS: 1 REF: SECTION 2.6
174. ANS:
strength; direction
direction; strength

PTS: 1 REF: SECTION 2.6

SHORT ANSWER

175. ANS:

- a. Interval
- b. Nominal
- c. Nominal
- d. Interval
- e. Ordinal

PTS: 1 REF: SECTION 2.1
176. ANS:

- a. Interval
- b. Nominal
- c. Interval
- d. Nominal
- e. Ordinal

PTS: 1 REF: SECTION 2.1
177. ANS:

- a. Ordinal
- b. Interval
- c. Interval
- d. Ordinal
- e. Nominal

PTS: 1 REF: SECTION 2.1
178. ANS:

- a. Nominal
- b. Nominal
- c. Interval
- d. Interval
- e. Interval
- f. Nominal

PTS: 1 REF: SECTION 2.1
179. ANS:

Nominal data example: Political party affiliation for voters using the code: 1 = Democrat, 2 = Republican, and 3 = Independent.

Ordinal data example: Response to a market research survey question measured on the Likert scale using the code: 1 = strongly agree, 2 = agree, 3 = neutral, 4 = disagree, and 5 = strongly disagree.

Interval data example: The temperature on a tennis court during the U.S. Open (degrees Fahrenheit).

PTS: 1 REF: SECTION 2.1
180. ANS:

The values of political affiliation cannot be ranked in order in any way.

PTS: 1 REF: SECTION 2.1
181. ANS:

The critical difference between them is that the intervals or differences between values of interval data are consistent and meaningful. That is, we can calculate the difference and interpret the results. Because the codes representing ordinal data are arbitrarily assigned except for the order, we cannot calculate and interpret differences.

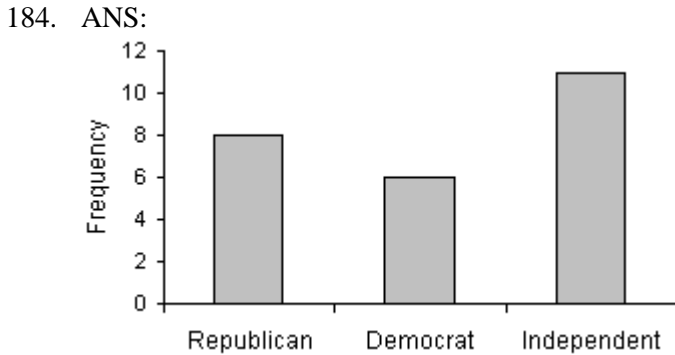
PTS: 1 REF: SECTION 2.1

182. ANS:
Example: Your actual age is interval data; your age group (1-10; 11-20; 21-30; etc) is ordinal data; and whether or not you are over age 21 is nominal data.

PTS: 1 REF: SECTION 2.1

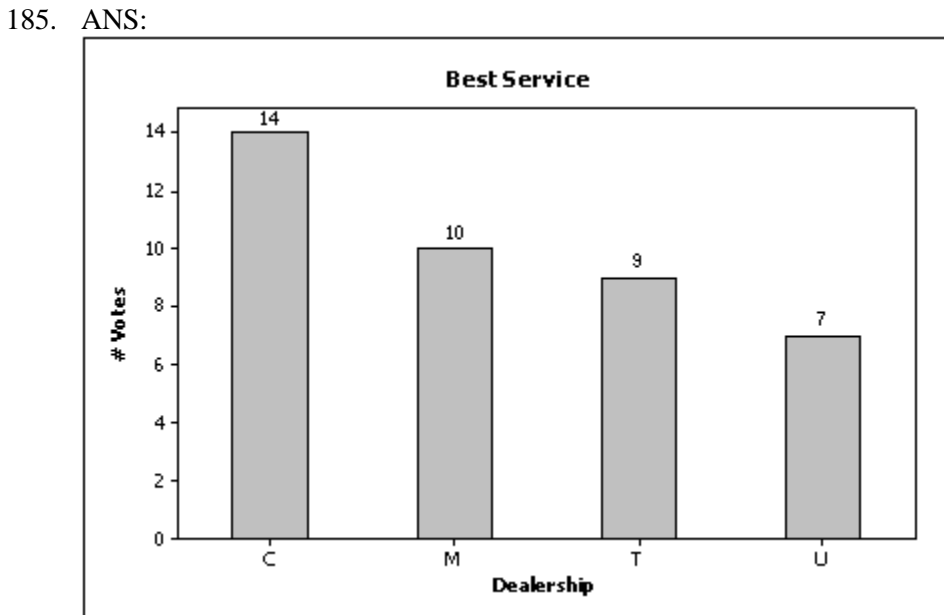
183. ANS:
a. Nominal
b. Nominal

PTS: 1 REF: SECTION 2.2



The bar graph shows most of the people surveyed were Independents (11 out of 25 = 44.0%); Republications followed with $8/25 = 32.0\%$ and Democrats made up 6 of the 25, or 24.0%.

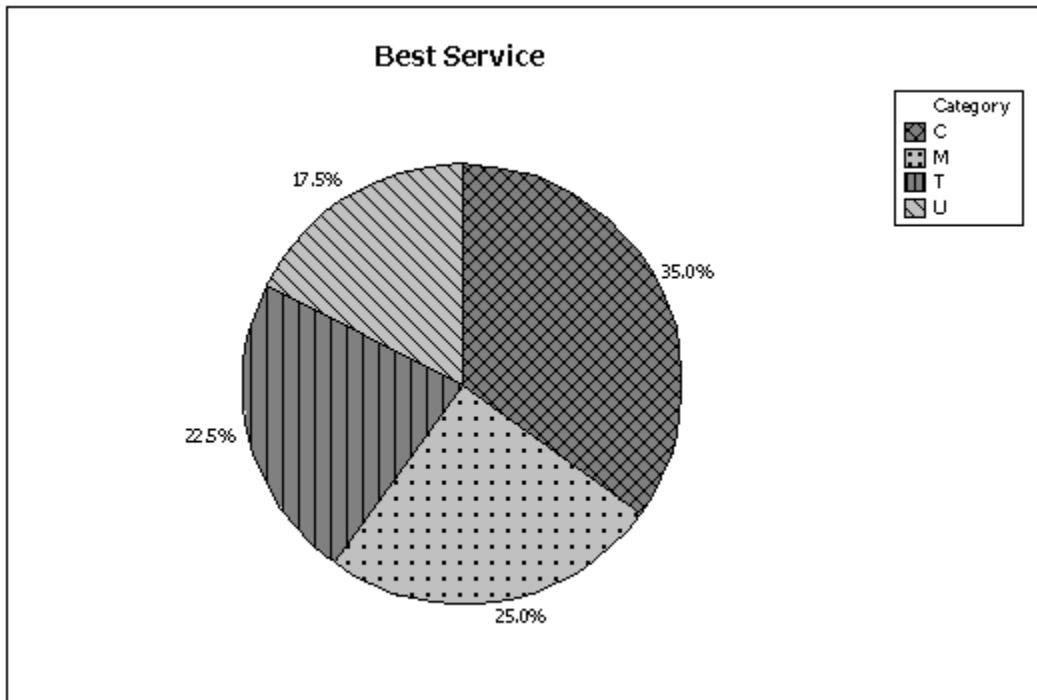
PTS: 1 REF: SECTION 2.2



University Chevrolet (U) received the fewest votes for best overall service (7 out of 40, or 17.5%) and came in last place.

PTS: 1 REF: SECTION 2.2

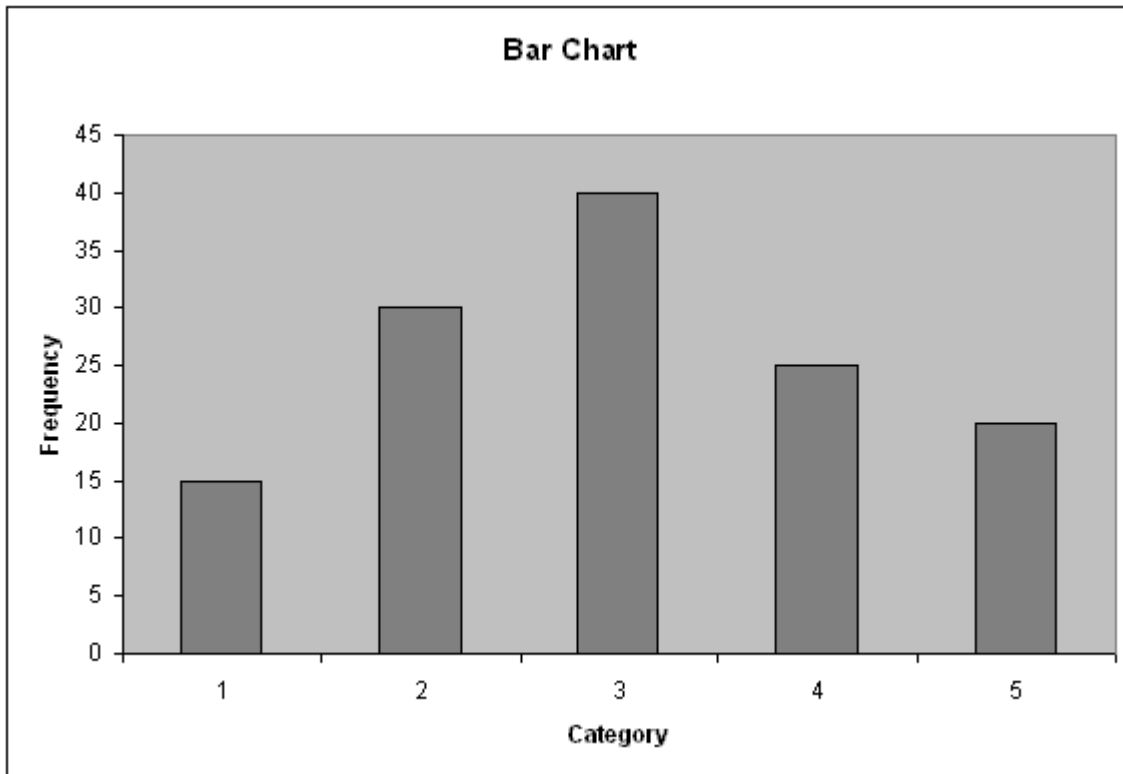
186. ANS:

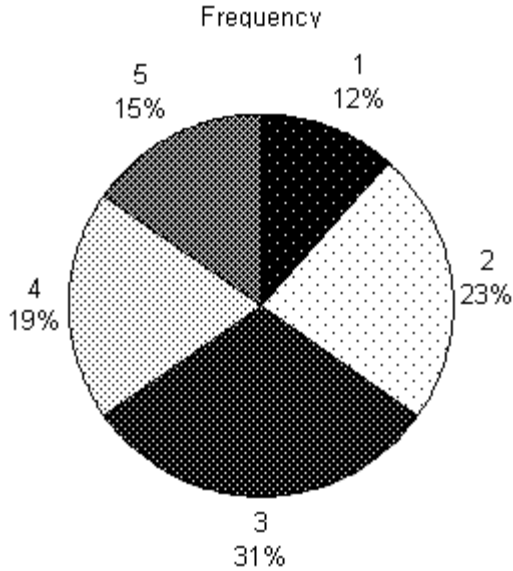


Carriage Motors (C) received the most votes (35.0%).

PTS: 1 REF: SECTION 2.2

187. ANS:





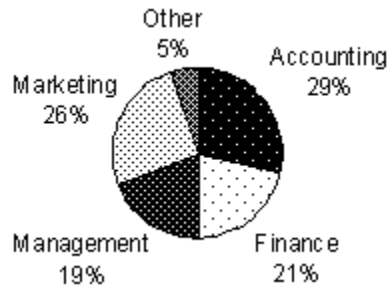
The most common time to complete the task was 3 minutes, which was recorded for 40 of the 130 (31%) of the employees.

PTS: 1 REF: SECTION 2.2

188. ANS: 200; you get this by totaling the counts for each major.

PTS: 1 REF: SECTION 2.2

189. ANS:



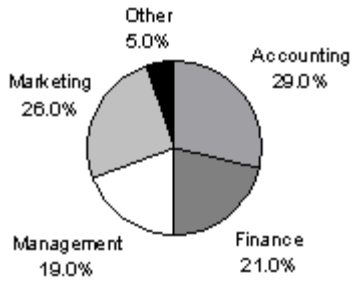
The most popular major was accounting (29.0%), followed by marketing (26%).

PTS: 1 REF: SECTION 2.2

190. ANS: No; you cannot reconstruct the original data from this graph because the scale on the frequency (Y) axis is not precise enough. For example, you can't tell exactly what number of students majored in finance; it appears to be 40 on this bar chart, but the actual value is 42, as seen on the original table.

PTS: 1 REF: SECTION 2.2

191. ANS:



No; you cannot reconstruct the original data from this pie chart alone, because you don't know how many observations are in each category.

PTS: 1 REF: SECTION 2.2

192. ANS:
Interval, numerical, or quantitative data.

PTS: 1 REF: SECTION 2.3

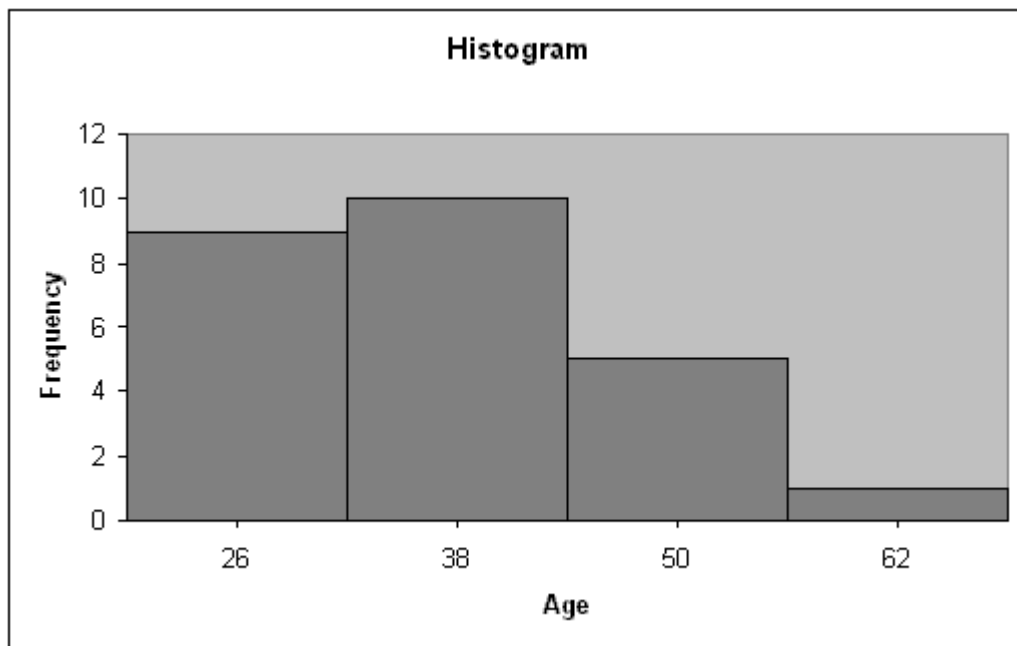
193. ANS:

Party	Frequency	Proportion
Republican	8	0.32
Democrat	6	0.24
Independent	11	0.44

According to the frequency distribution above, the Independents in Minnesota outnumber the Republicans and Democrats.

PTS: 1 REF: SECTION 2.3

194. ANS:

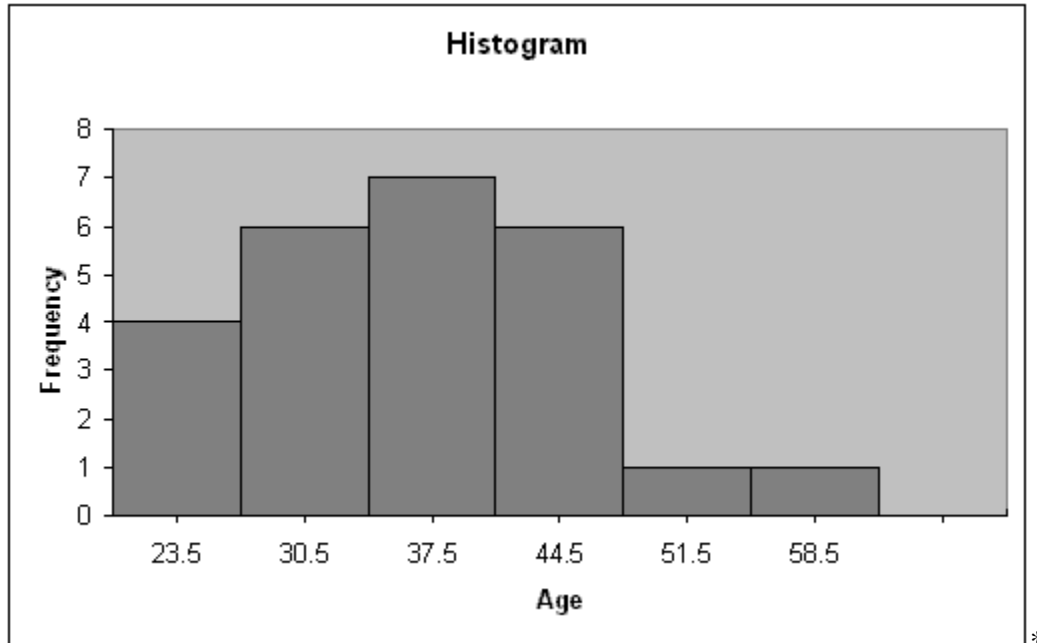


This histogram of ages of salespersons is positively skewed.

PTS: 1

REF: SECTION 2.3

195. ANS:



This histogram of ages of salespersons is positively skewed.

PTS: 1

REF: SECTION 2.3

196. ANS:

Stem	Leaf
2	144688
3	0012445578
4	0135557
5	36

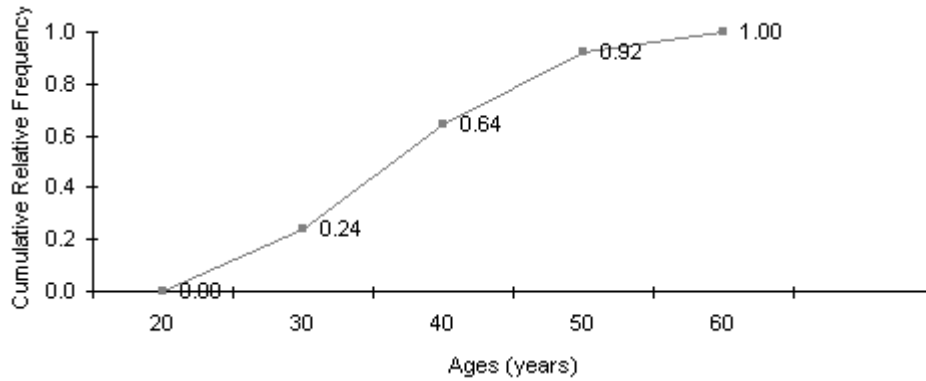
The minimum age is 21 and the maximum age is 56.

PTS: 1

REF: SECTION 2.3

197. ANS:

According to the ogive below, the proportions are 0.24; $1 - 0.64 = 0.36$; and $0.92 - 0.64 = 0.28$, respectively.



PTS: 1 REF: SECTION 2.3

198. ANS:

Stem	Leaf
3	68
4	1278
5	14456789
6	12234578889
7	11456799
8	12346
9	14

The data is relatively symmetric and bell shaped.

PTS: 1 REF: SECTION 2.3

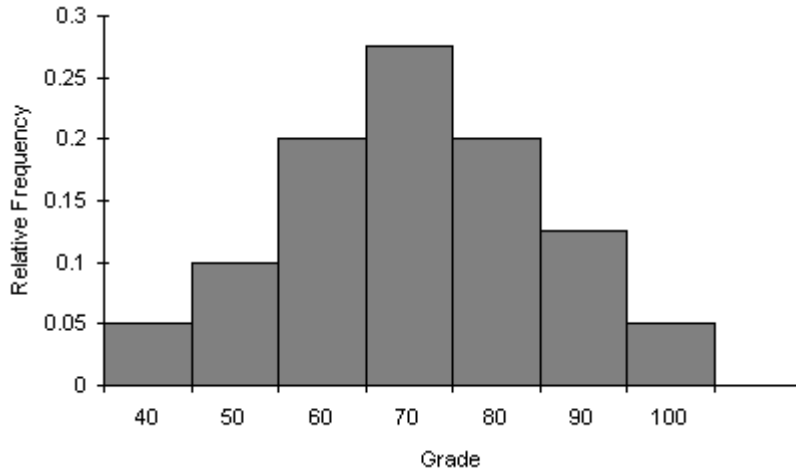
199. ANS:

Class Limits	Frequency	Relative Frequency
30 to 39	2	0.050
40 to 49	4	0.100
50 to 59	8	0.200
60 to 69	11	0.275
70 to 79	8	0.200
80 to 89	5	0.125
90 to 99	2	0.050
Total	40	1.00

The data is relatively symmetric and bell shaped.

PTS: 1 REF: SECTION 2.3

200. ANS:



The distribution of the data is relatively symmetric and bell shaped.

PTS: 1 REF: SECTION 2.3

201. ANS:

The distribution of the data is symmetrical and bell-shaped, with 67.5% of the observations between 50 and 80. The center looks to be around 65.

PTS: 1 REF: SECTION 2.3

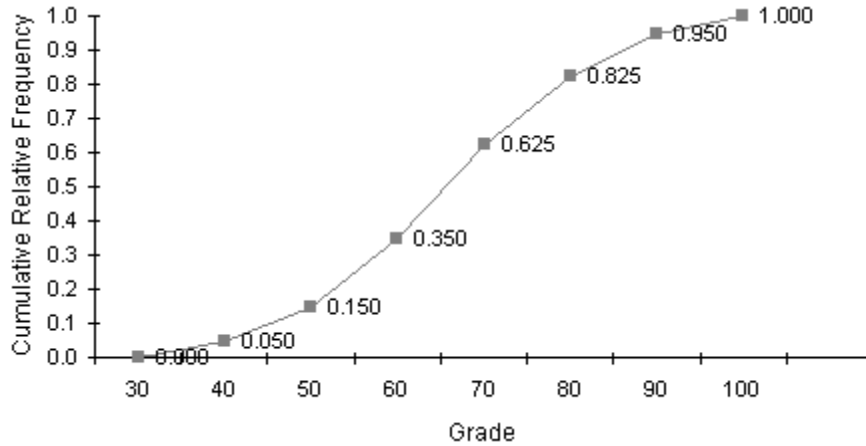
202. ANS:

Classes	Cumulative Frequency	Cumulative Relative Frequency
< 40	2	0.050
< 50	6	0.150
< 60	14	0.350
< 70	25	0.625
< 80	33	0.825
< 90	38	0.950
< 100	40	1.000

$$0.35; 1 - 0.625 = 0.375$$

PTS: 1 REF: SECTION 2.3

203. ANS:



The proportion of grades that are between 80 and 90 = $0.950 - 0.825 = 0.125$.

PTS: 1 REF: SECTION 2.3

204. ANS:

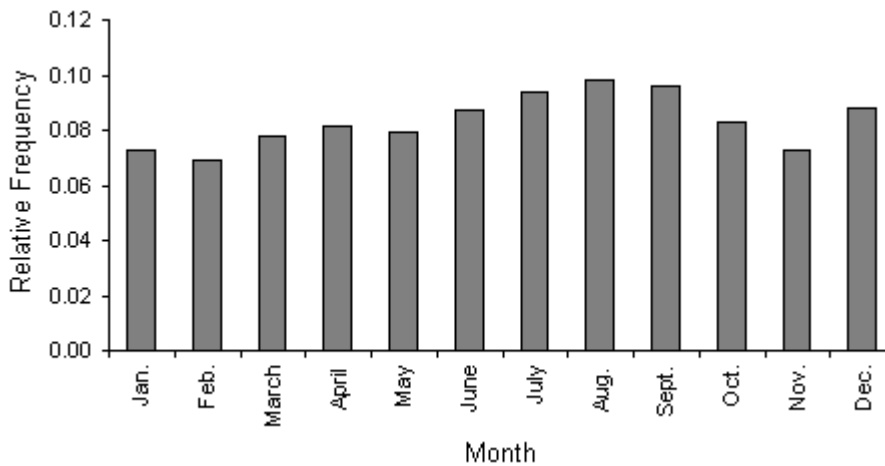
Dealer	Frequency	Relative frequency
A	9	0.225
B	10	0.250
C	14	0.350
D	7	0.175

0.175 of the car buyers rated dealer D as the best.

PTS: 1 REF: SECTION 2.3

205. ANS:

See the graph below. There are 12 observations in this data set; one sales amount is listed for each month.



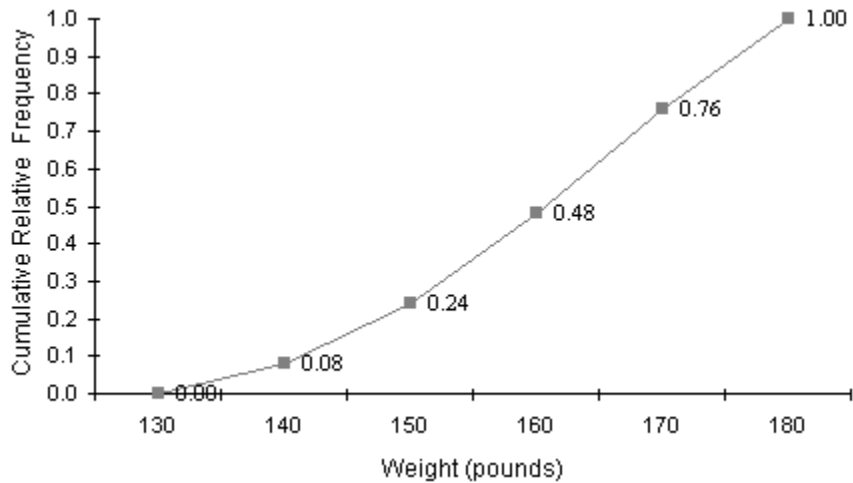
PTS: 1 REF: SECTION 2.3

206. ANS:

8; 7; 6; 9; 12

PTS: 1 REF: SECTION 2.3

207. ANS:



The proportions are $1 - 0.48 = 0.52$; 0.24 ; $1 - 0.08 = 0.92$, respectively.

PTS: 1 REF: SECTION 2.3

208. ANS:

$$10 + 18 + 16 + 12 + 3 + 1 = 60$$

PTS: 1 REF: SECTION 2.3

209. ANS:

$$(0 \times 10) + (1 \times 18) + (2 \times 16) + (3 \times 12) + (4 \times 3) + (5 \times 1) = 103$$

PTS: 1 REF: SECTION 2.3

210. ANS:

$$10/60 = .17$$

PTS: 1 REF: SECTION 2.3

211. ANS:

$18/60 = 30\%$ of the drivers had one claim in the last three years.

PTS: 1 REF: SECTION 2.3

212. ANS:

$$7 + 11 + 14 + 8 + 10 = 50$$

PTS: 1 REF: SECTION 2.3

213. ANS:

$$(1 \times 7) + (2 \times 11) + (3 \times 14) + (4 \times 8) = (5 \times 10) = 153$$

PTS: 1 REF: SECTION 2.3

214. ANS:

$$14/50 = 0.28$$

PTS: 1 REF: SECTION 2.3

215. ANS:
This is the total proportion of employees supervising 4 or fewer employees: $40/50 = 0.80$ or 80%.
- PTS: 1 REF: SECTION 2.3
216. ANS:
 $3/25 = 12\%$
- PTS: 1 REF: SECTION 2.3
217. ANS:
 $17/25 = 68\%$
- PTS: 1 REF: SECTION 2.3
218. ANS:
 $13/25 = 52\%$
- PTS: 1 REF: SECTION 2.3
219. ANS:
 $2/25 = 8\%$
- PTS: 1 REF: SECTION 2.3
220. ANS:
Data can be classified according to whether the observations are measured at the same time or whether they represent measurements at successive points in time. The former are called cross-sectional data and the latter, time-series data.
- PTS: 1 REF: SECTION 2.4
221. ANS:
A histogram is a display of cross-sectional data and a line chart is a display of time-series data.
- PTS: 1 REF: SECTION 2.4
222. ANS:
Pepper prices started at around \$4.50 in January, then lowered consistently through the months of January through July, where they hit their lowest price, \$2.00 per pound. Then prices sharply increased until October, and stayed about the same through December. Prices started the year and ended the year at about the same level (\$4.50 per pound).
- PTS: 1 REF: SECTION 2.4
223. ANS:
 $30/100 = 30\%$
- PTS: 1 REF: SECTION 2.5
224. ANS:
 $30/90 = 33.3\%$
- PTS: 1 REF: SECTION 2.5
225. ANS:
Yes, they are related. Of those staying up all night, $70/100 = 70\%$ did poorly. Of those who didn't stay up all night, $40/100 = 40\%$ did poorly. Staying up all night before this midterm is associated with lower performance.

PTS: 1 REF: SECTION 2.5

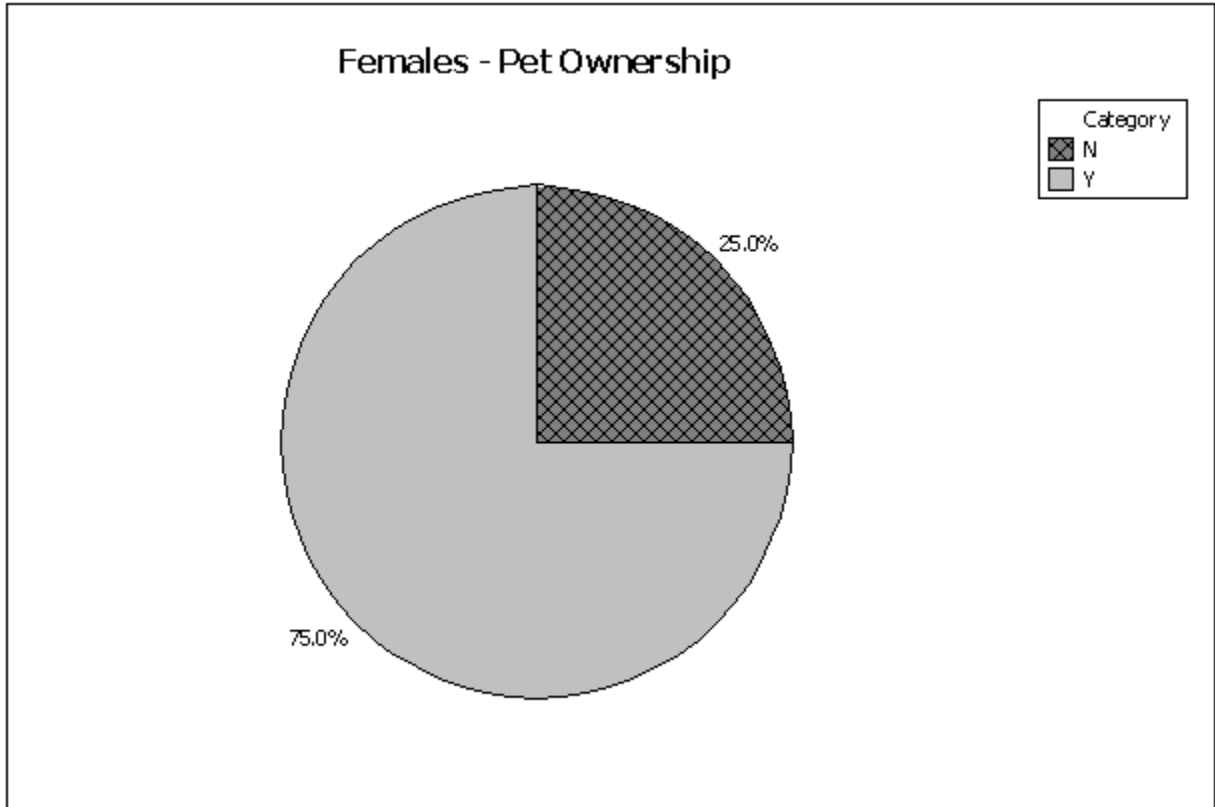
226. ANS:

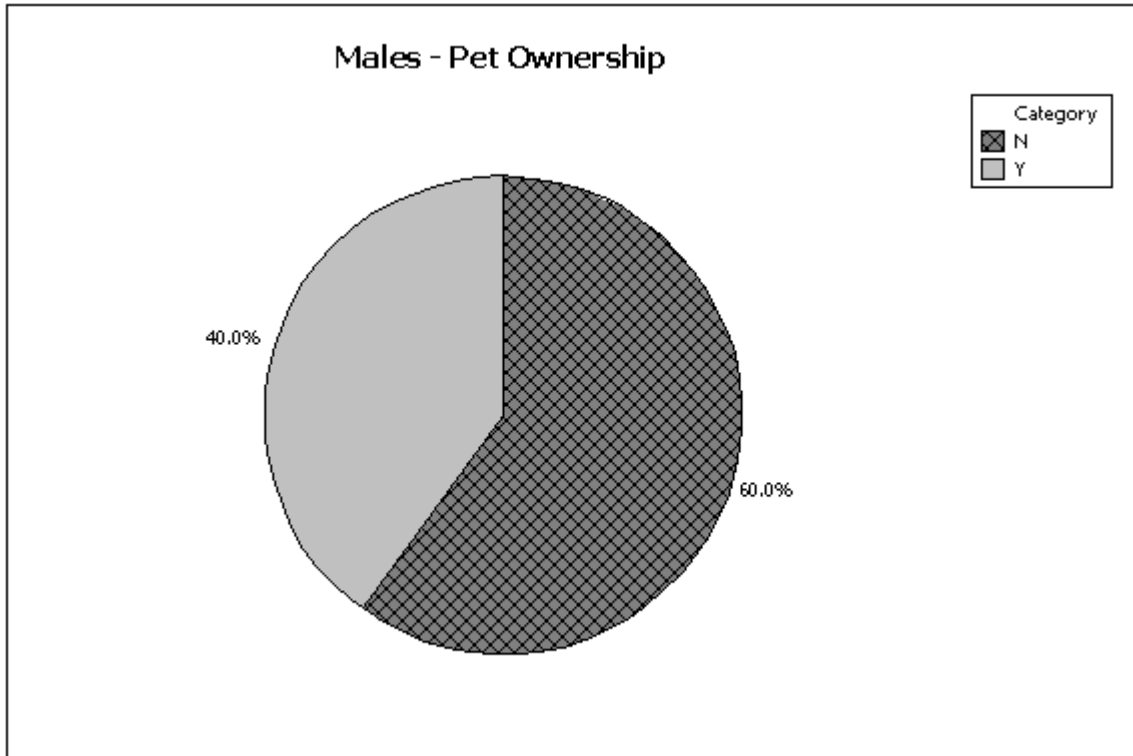
Of those who stayed up all night, $30/100 = 30\%$ did well and 70% did not. Of those who didn't stay up all night, $60/100 = 60\%$ did well and 40% did not.

PTS: 1 REF: SECTION 2.5

227. ANS:

The pie charts below show gender and pet ownership are related. More females own pets than males (75% vs. 40%).



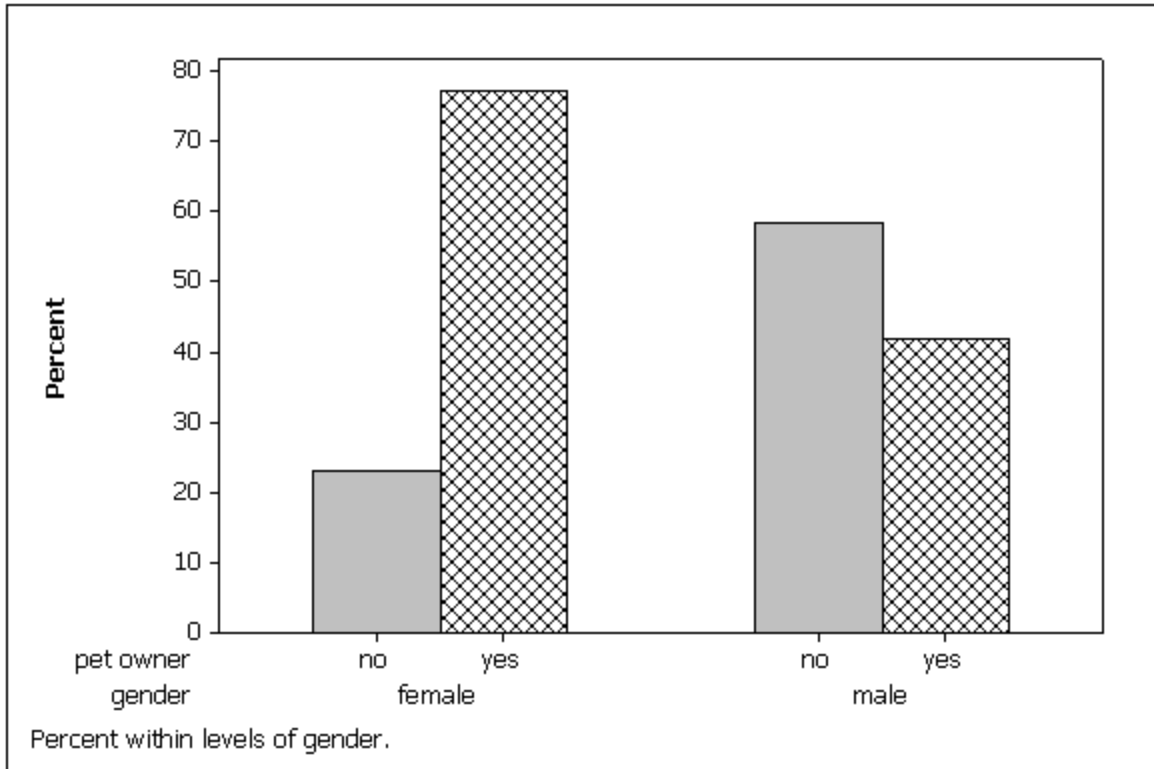


PTS: 1

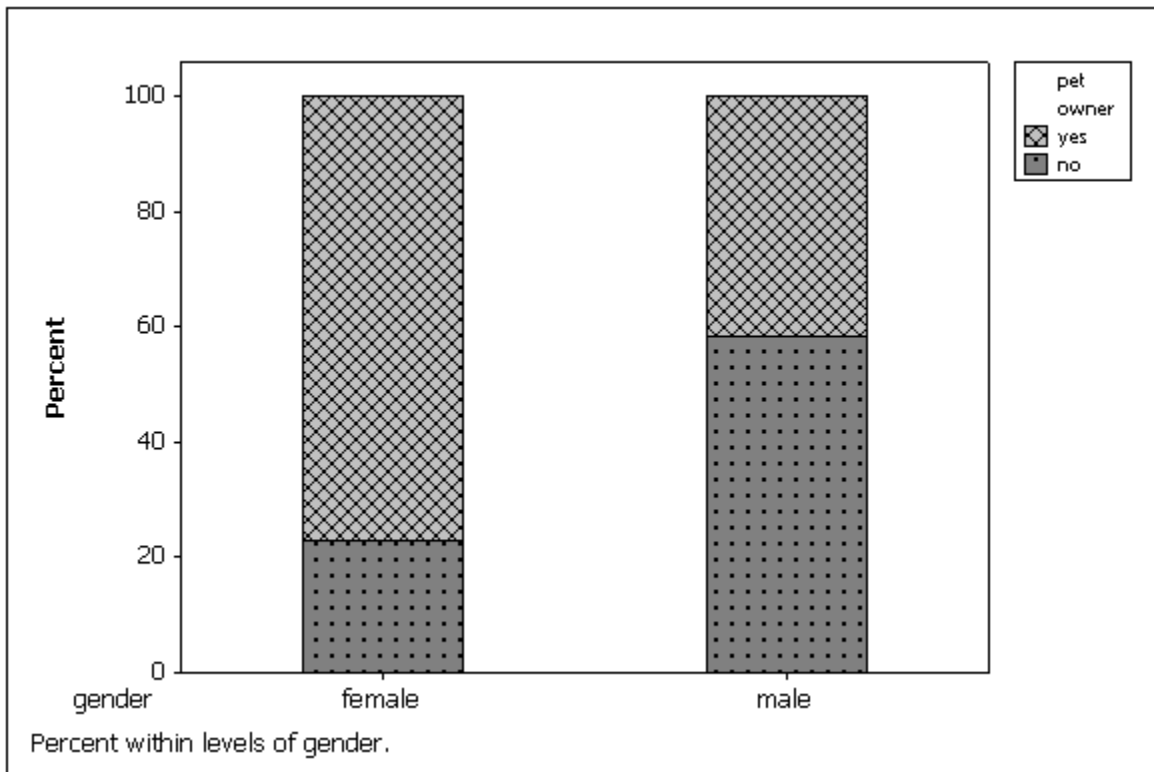
REF: SECTION 2.5

228. ANS:

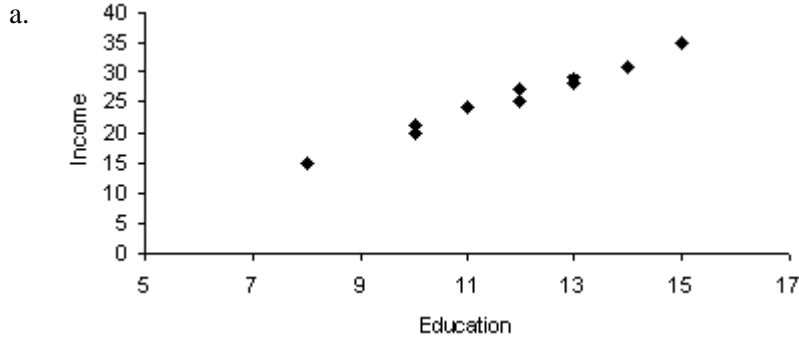
The first "side-by-side" bar chart below shows gender and pet ownership are related. More females own pets than males (75% vs. 40%.) Note the bar charts could be stacked also, and show the same results; see the second "stacked" bar chart below.



OR



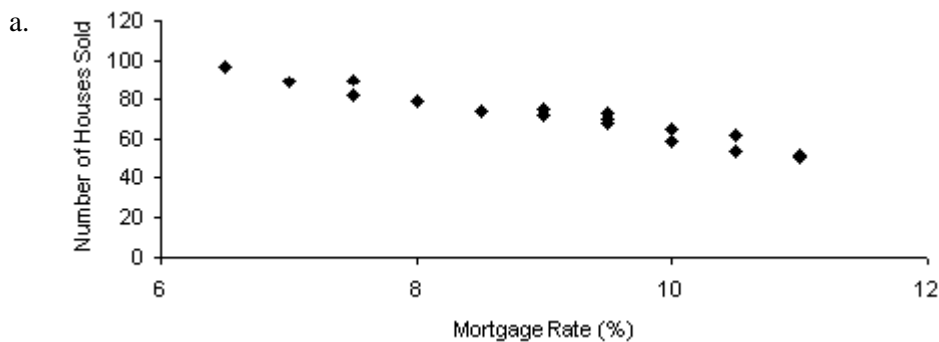
229. ANS:



b. There is a very strong positive linear relationship between education and income; as years of education increase, income also increases in a linear manner.

PTS: 1 REF: SECTION 2.6

230. ANS:



b. There is a strong negative linear relationship between the mortgage rate and the number of houses sold. As the mortgage rate increases, the number of houses sold decreases, in a linear way.

PTS: 1 REF: SECTION 2.6

231. ANS:

If two variables are linearly related, it does not mean that one is causing the other to increase or decrease. It means a change in one variable is associated with a change in the other variable, in a linear way. Correlation implies association, not causation.

PTS: 1 REF: SECTION 2.6

232. ANS:

As the number of police officers increases, number of crimes goes down. As the number of police officers decreases, the number of crimes goes up.

PTS: 1 REF: SECTION 2.6

233. ANS:

The strength and direction of the linear relationship between the two variables.

PTS: 1 REF: SECTION 2.6

234. ANS:

No; scatter diagrams plot points of X and Y when both variables are interval variables. You cannot talk about a nominal variable increasing or decreasing.

PTS: 1

REF: SECTION 2.6