Chapter 3
Describing Data: Numerical Measures

True/False

1. A value that is typical or representative of the data is referred to as a measure of central location.

2. The arithmetic mean is the sum of the observations divided by the total number of observations.

3. For a set of data arranged or sorted in numerical order, the value of the observation in the center is called the weighted mean.

4. A set of ordinal or interval data may only have one mode.

5. If a variable is measured at the interval level, all the values are included when computing the mean.

6. A variable measured at the interval level can have more than one arithmetic mean.

7. The mode is the value of the observation that appears most frequently.

8. A distribution that has the same shape on either side of the center is said to be symmetrical.

9. A negatively skewed distribution is not symmetrical. The long tail is to the left or in the negative direction.

10. The geometric mean is the nth root of n observations.

11. A statistic is a measurable characteristic of the population.

12. A parameter is a measurable characteristic of a sample.

13. The median can be determined for any set of interval-level data.

14. Extremely high or low scores affect the value of the median.
15. The sum of the deviations from the mean for the set of numbers 4, 9 and 5 will equal zero.

16. For salaries of $102,000, $98,000, $45,000, $106,000 and $101,000, the arithmetic mean would be an appropriate average.

17. Three persons earn $8 an hour, six earn $9 an hour, and one earns $12 an hour. The weighted mean hourly wage is $9.

18. For any distribution, there are an equal number of values above the mean and below it.

19. For a data set with an even number of ungrouped values, the median is the arithmetic mean of the two middle values.

20. For a data set with an even number of ungrouped values, half of the values will be less than the median.

21. In a negatively skewed distribution, the mean is always greater than the median.

22. In a negatively skewed distribution, the mean is smaller than the median or mode and the mode occurs at the peak of the curve.

23. In a positively skewed distribution, the mode is greater than the median.

24. Dispersion is the degree of variation in the data.

25. The mean deviation is the mean of the actual values of the deviations from the arithmetic mean.

26. The variance is the mean of the sum of the squared deviations between each observation and the median.

27. The standard deviation is the positive square root of the variance.

29. The Empirical states that about 68% of the observation will lie within one standard deviation of the mean; about 95% of the observations will lie within two standard deviations of the mean; and virtually all (99.7%) will lie within three standard deviations of the mean.
30. The mean absolute deviation is the most widely used measure of dispersion.

31. For a symmetrical distribution, the variance is equal to the standard deviation.

32. In a company, the standard deviation of the ages of female employees is six years and the standard deviation of the ages of male employees is ten years. These statistics indicate that there is more spread in the ages of the female employees.

33. If we find the deviation of each value from the median, the sum of these deviations is always zero.

34. If a frequency distribution is open-ended, the variance cannot be determined.

35. The range cannot be computed for data grouped in a frequency distribution having an open end.

**Multiple Choice**

36. For which measure of central location will the sum of the deviations of each value from the data's average will always be zero?
   A) Mode  
   B) Mean  
   C) Median  
   D) Geometric mean  
   E) None of the above

37. For a set of grouped or ungrouped data, which measures of central location always have only one value?
   A) Mode and median  
   B) Mode and mean  
   C) Mode and geometric mean  
   D) Mean and median

38. Which measures of central location are not affected by extremely small or extremely large values?
   A) Mean and median  
   B) Mean and mode  
   C) Mode and median  
   D) Geometric mean and mean  
   E) None of the above
39. What is the relationship among the mean, median and mode in a symmetric distribution?
   A) They are all equal
   B) The mean is always the smallest value
   C) The mean is always the largest value
   D) The mode is the largest value

40. For a data set, half of the observations are always greater than the ________.  
   A) Median
   B) Mode
   C) Mean
   D) Geometric mean

41. What is the lowest level of measurement that a median can be computed?  
   A) Nominal
   B) Ordinal
   C) Interval
   D) Ratio

42. For an ungrouped data set with an odd number of observations that have been sorted or arrayed from smallest to largest values, where is the median located?  
   A) n
   B) n/2
   C) (n + 1)/2
   D) n + 1/2

43. Which measure of central location is used to determine an average annual percent increase?  
   A) Arithmetic mean
   B) Weighted mean
   C) Mode
   D) Geometric mean
   E) Median

44. If a frequency distribution has open-ended intervals at the extremes, which measure of central location is the most difficult to estimate?  
   A) Median
   B) Mode
   C) Mean
   D) All of the above
   E) None of the above
45. Which one of the following is referred to as the population mean?
A) Statistic
B) .
C) Sample
D) None of the above

46. Fifteen accounting majors had an average grade of 90 on a finance exam. Seven marketing majors averaged 85, while ten finance majors averaged 93 on the same exam. What is the weighted mean for the 32 students taking the exam?
A) 89.84
B) 89.33
C) 89.48
D) Impossible to determine without more information

47. In the calculation of the arithmetic mean for grouped data, which value is used to represent all the values in a particular class?
A) The upper limit of the class
B) The lower limit of the class
C) The frequency of the class
D) The cumulative frequency preceding the class
E) The class midpoint.

48. On a survey questionnaire, students were asked to indicate their class rank in college. If there were only four choices from which to choose, which measure(s) of central location would be appropriate to use for the data generated by that questionnaire item?
A) Mean and median
B) Mean and mode
C) Mode and median
D) Mode only
E) Median only

49. What is the median of 26, 30, 24, 32, 32, 31, 27 and 29?
A) 32
B) 29
C) 30
D) 29.5
50. The net incomes (in $ millions) of a sample of steel fabricators are: $86, $67, $86 and $85. What is the modal net income?
A) $67
B) $85
C) $85.5
D) $86

51. A sample of light trucks using diesel fuel revealed the following distribution based on fuel efficiency, i.e., miles per gallon (mpg).

<table>
<thead>
<tr>
<th>mpg</th>
<th>Number of Trucks</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 up to 13</td>
<td>2</td>
</tr>
<tr>
<td>13 up to 16</td>
<td>5</td>
</tr>
<tr>
<td>16 up to 19</td>
<td>10</td>
</tr>
<tr>
<td>19 up to 22</td>
<td>8</td>
</tr>
<tr>
<td>22 up to 25</td>
<td>3</td>
</tr>
<tr>
<td>25 up to 28</td>
<td>2</td>
</tr>
</tbody>
</table>

What is the arithmetic mean miles per gallon?
A) 16.9
B) 18.6
C) 17.0
D) 17.9
E) None of the above

52. The ages of newly hired, unskilled employees were grouped into the following distribution:

<table>
<thead>
<tr>
<th>Ages</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>18 up to 21</td>
<td>4</td>
</tr>
<tr>
<td>21 up to 24</td>
<td>8</td>
</tr>
<tr>
<td>24 up to 27</td>
<td>11</td>
</tr>
<tr>
<td>27 up to 30</td>
<td>20</td>
</tr>
<tr>
<td>30 up to 33</td>
<td>7</td>
</tr>
</tbody>
</table>

What is the mean age?
A) 25.51
B) 24.01
C) 26.99
D) 26.58
E) 20.00
53. A sample of the daily production of transceivers was organized into the following distribution.

<table>
<thead>
<tr>
<th>Daily Production</th>
<th>Frequencies</th>
</tr>
</thead>
<tbody>
<tr>
<td>80 up to 90</td>
<td>5</td>
</tr>
<tr>
<td>90 up to 100</td>
<td>9</td>
</tr>
<tr>
<td>100 up to 110</td>
<td>20</td>
</tr>
<tr>
<td>110 up to 120</td>
<td>8</td>
</tr>
<tr>
<td>120 up to 130</td>
<td>6</td>
</tr>
<tr>
<td>130 up to 140</td>
<td>2</td>
</tr>
</tbody>
</table>

What is the mean daily production?

A) 106.4  
B) 101.4  
C) 111.4  
D) 105.0  
E) 20.0

54. The net annual sales of a sample of small retail clothing stores were organized into the following relative frequency distribution.

<table>
<thead>
<tr>
<th>Net Sales (in $ millions)</th>
<th>Percent of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 up to 4</td>
<td>13</td>
</tr>
<tr>
<td>4 up to 7</td>
<td>14</td>
</tr>
<tr>
<td>7 up to 10</td>
<td>40</td>
</tr>
<tr>
<td>10 up to 13</td>
<td>23</td>
</tr>
<tr>
<td>13 or more</td>
<td>10</td>
</tr>
</tbody>
</table>

What is the mean net sales (in $ millions)?

A) $7.09  
B) $10.09  
C) $8.59  
D) $8.325  
E) Mean cannot be computed

55. A stockbroker placed the following order for a customer:

- 50 shares of Kaiser Aluminum preferred at $104 a share
- 100 shares of GTE preferred at $25.25 a share
- 20 shares of Boston Edison preferred at $9.125 a share
What is the weighted arithmetic mean price per share?
A) $ 25.25
B) $ 79.75
C) $ 103.50
D) $ 46.51

56. During the past six months, the purchasing agent bought:

<table>
<thead>
<tr>
<th>Tons of Coal</th>
<th>1,200</th>
<th>3,000</th>
<th>500</th>
</tr>
</thead>
<tbody>
<tr>
<td>Price per Ton</td>
<td>$28.50</td>
<td>$87.25</td>
<td>$88.00</td>
</tr>
</tbody>
</table>

What is the weighted arithmetic mean price per ton?
A) $87.25
B) $72.33
C) $68.47
D) $89.18
E) 67.92

57. A sample of single persons receiving social security payments revealed these monthly benefits: $826, $699, $1,087, $880, $839 and $965. How many observations are below the median?
A) 0
B) 1
C) 2
D) 3
E) 3.5

58. The number of work stoppages in a highly industrialized region for selected months are: 6, 0, 10, 14, 8 and 0. What is the median number of stoppages?
A) 0
B) 6
C) 7
D) 8
E) 3

59. The U.S. Federal Aviation Administration reported that passenger revenues on international flights increased from $528 million in 1983 to $5,100 million in 2006. What is the geometric mean annual percent increase in international passenger revenues?
A) 10.4
B) 27.9
C) 103.6
D) 9.96
E) 2814

60. The Investment Company Institute reported in its Mutual Fund Fact Book that the number of mutual funds increased from 5725 in 1995 to 7977 in 2005. What is the geometric mean annual percent increase in the number of funds?
A) 1.034
B) 3.37
C) 39.34
D) 71.77
E) 633.5

61. Assume a student received the following grades for the semester: History, B; Statistics, A; Spanish, C; and English, C. History and English are 5 credit hour courses, Statistics a 4 credit hour course and Spanish a 3 credit hour course. If 4 grade points are assigned for an A, 3 for a B and 2 for a C, what is the weighted mean for the semester grades?
A) 4.00
B) 1.96
C) 2.61
D) 3.01
E) 2.88

62. Production of passenger cars in Japan increased from 3.94 million in 1994 to 6.74 million in 2004. What is the geometric mean annual percent increase?
A) 4.0
B) 1.9
C) 5.5
D) 16.6
E) 47.3

63. A sample of the paramedical fees charged by clinics revealed these amounts: $55, $49, $50, $45, $52 and $55. What is the median charge?
A) $47.50
B) $51.00
C) $52.00
D) $55.00
64. The lengths of time (in minutes) several underwriters took to review applications for similar insurance coverage are: 50, 230, 52 and 57. What is the median length of time required to review an application?
A) 54.5
B) 141.0
C) 97.25
D) 109.0

65. A bottling company offers three kinds of delivery service – instant, same day and within five days. The profit per delivery varies according to the kind of delivery. The profit for an instant delivery is less than the other kinds because the driver has to go directly to a grocery store with a small load and return to the bottling plant. To find out what effect each type of delivery has on the profit picture, the company summarized the data in the following table based on deliveries for the previous quarter.

<table>
<thead>
<tr>
<th>Type of Delivery</th>
<th>Number of Deliveries During the Quarter</th>
<th>Profit per Delivery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instant</td>
<td>100</td>
<td>$ 70</td>
</tr>
<tr>
<td>Same day</td>
<td>60</td>
<td>100</td>
</tr>
<tr>
<td>Within five days</td>
<td>40</td>
<td>160</td>
</tr>
</tbody>
</table>

What is the weighted mean profit per delivery?
A) $72
B) $110
C) $142
D) $97
E) $66.67

66. The U.S. Department of Education reported that for the past seven years 4,033, 5,652, 6,407, 7,201, 8,719, 11,154, and 15,121 people received bachelor's degrees in computer and information sciences. What is the annual arithmetic mean number of degrees awarded?
A) About 12,240
B) About 8,327
C) About 6,217
D) About 15,962

67. Which measure of central location is found by arranging the data from smallest to largest and selecting the middle value?
A) Arithemetic mean  
B) Median  
C) Mode  
D) Geometric mean  
E) Standard deviation

68. The number of students at a local university increased from 2,500 students to 5000 students in 10 years. Based on a geometric mean, the university grew at an average percentage rate of
A) 2,500 students per year  
B) 1.071 percent per year  
C) 7.1 percent per year  
D) 250 students per year

69. A question in a market survey asks for a respondent's favorite car color. Which measure of central location should be used to summarize this question?
A) Mode  
B) Median  
C) Mean  
D) Geometric mean

70. Sometimes, data has two values that have the highest and equal frequencies. In this case, the distribution of the data can best be summarized as
A) symmetric  
B) bimodal (having two modes)  
C) positively skewed  
D) negatively skewed

71. A disadvantage of using an arithmetic mean to summarize a set of data is
A) The arithmetic mean sometimes has two values  
B) It can be used for interval and ratio data  
C) It is always different from the median  
D) It can be biased by one or two extremely small or large values.

72. The denominator for a mean of grouped data is:
A) N, the population size  
B) n, the sample size  
C) The sum of the group frequencies  
D) The number of groups
73. The mean, as a measure of central location would be inappropriate for which one of the following?
   A) Ages of adults at a senior citizen center
   B) Incomes of lawyers
   C) Number of pages in textbooks on statistics
   D) Marital status of college students at a particular university

74. What is a disadvantage of the range as a measure of dispersion?
   A) Based on only two observations
   B) Can be distorted by a large mean
   C) Not in the same units as the original data
   D) Has no disadvantage

75. Rank the measures of dispersion in terms of their relative computational difficulty from least to most difficulty.
   A) Mode, median, mean
   B) Range, mean deviation, variance
   C) Variance, mean deviation, range
   D) There is no difference

76. A purchasing agent for a trucking company is shopping for replacement tires for their trucks from two suppliers. The suppliers' prices are the same. However, Supplier A's tires have an average life of 60,000 miles with a standard deviation of 10,000 miles. Supplier B's tires have an average life of 60,000 miles with a standard deviation of 2,000 miles.
   Which of the following statements is true?
   A) The two distributions of tire life are the same
   B) On average, Supplier A's tires have a longer life then Supplier B's tires
   C) The life of Supplier B's tire is more predictable than the life of Supplier A's tires
   D) The dispersion of Supplier A's tire life is less than the dispersion of Supplier B's tire life

77. The sum of the differences between sample observations and the sample mean is
   A) Zero
   B) The mean deviation
   C) The range
   D) The standard deviation
78. What disadvantage(s) are there of the mean deviation?
A) Based on only two observations
B) Based on deviations from the mean
C) Uses absolute values, which are difficult to manipulate
D) All of the above

79. Which of the following measures of dispersion are based on deviations from the mean?
A) Variance
B) Standard deviation
C) Mean deviation
D) All of the above

80. What is the relationship between the variance and the standard deviation?
A) Variance is the square root of the standard deviation
B) Variance is the square of the standard deviation
C) Variance is twice the standard deviation
D) No constant relationship between the variance and the standard deviation

81. According to Chebyshev's Theorem, what percent of the observations lie within plus and minus 1.75 standard deviations of the mean?
A) 56%
B) 95%
C) 67%
D) Cannot compute because it depends on the shape of the distribution

82. What is the range for a sample of March electric bills amounts for all-electric homes of similar sizes (to the nearest dollar): $212, $191, $176, $129, $106, $92, $108, $109, $103, $121, $175 and $194.
A) $100
B) $130
C) $120
D) $112

83. A survey of passengers on domestic flights revealed these miles:
The following table shows the number of passengers flown by an airline in different mileage ranges:

<table>
<thead>
<tr>
<th>Miles Flown</th>
<th>Number of Passengers</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 up to 500</td>
<td>16</td>
</tr>
<tr>
<td>500 up to 900</td>
<td>41</td>
</tr>
<tr>
<td>900 up to 1300</td>
<td>81</td>
</tr>
<tr>
<td>1300 up to 1700</td>
<td>11</td>
</tr>
<tr>
<td>1700 up to 2100</td>
<td>9</td>
</tr>
<tr>
<td>2100 up to 2500</td>
<td>6</td>
</tr>
</tbody>
</table>

What is the range (in miles)?
A) 2,499
B) 1,100
C) 2,400
D) 1,999

84. Which measure of dispersion disregards the algebraic signs (plus and minus) of each difference between X and the mean?
A) Standard deviation
B) Mean deviation
C) Arithmetic mean
D) Variance

85. The following are the weekly amounts of welfare payments made by the federal government to a sample of six families: $139, $136, $130, $136, $147 and $136. What is the range?
A) $0
B) $14
C) $52
D) $17

86. Measures of dispersion calculated from grouped data are
A) Estimates
B) Biased
C) Means
D) Skewed

87. The ages of a sample of the typewriters used by the typists in the typing pool were organized into the following table:
### Ages (in years) Number
- 2 up to 5: 2
- 5 up to 8: 5
- 8 up to 11: 10
- 11 up to 14: 4
- 14 up to 17: 2

What is the sample variance?
- A) About 10.2
- B) About 6.1
- C) About 14.0
- D) About 3.2
- E) None of the above

88. The weights of a sample of crates ready for shipment to Laos are (in kilograms): 103, 97, 101, 106 and 103. What is the mean deviation?
- A) 0 kg
- B) 6.9 kg
- C) 102.0 kg
- D) 2.4 kg
- E) 9.0 kg

89. The closing prices of a common stock have been 61.5, 62, 61.25, 60.875 and 61.5 for the past week. What is the range?
- A) $1.250
- B) $1.750
- C) $1.125
- D) $1.875

90. Ten experts rated a newly developed chocolate chip cookie on a scale of 1 to 50. Their ratings were: 34, 35, 41, 28, 26, 29, 32, 36, 38 and 40. What is the mean deviation?
- A) 8.00
- B) 4.12
- C) 12.67
- D) 0.75

91. The weights (in kilograms) of a group of crates being shipped to Panama are 95, 103, 110, 104, 105, 112 and 92. What is the mean deviation?
- A) 5.43 kg
- B) 6.25 kg
C) 0.53 kg
D) 52.50 kg

92. A sample of the personnel files of eight male employees revealed that, during a six-month period, they lost the following number of days due to illness: 2, 0, 6, 3, 10, 4, 1 and 2. What is the mean deviation (in days)?
A) 1
B) 0
C) 3 1/8
D) 2 3/8

93. A sample of the monthly amounts spent for food by families of four receiving food stamps approximates a symmetrical distribution. The sample mean is $150 and the standard deviation is $20. Using the Empirical Rule, about 95 percent of the monthly food expenditures are between what two amounts?
A) $100 and $200
B) $85 and $105
C) $205 and $220
D) $110 and $190

94. The ages of all the patients in the isolation ward of the hospital are 38, 26, 13, 41 and 22. What is the population variance?
A) 106.8
B) 91.4
C) 240.3
D) 42.4

95. A sample of assistant professors on the business faculty at state supported institutions in Ohio revealed the mean income to be $32,000 for 9 months with a standard deviation of $3,000. Using Chebyshev's Theorem, what proportion of the faculty earns more than $26,000 but less than $38,000?
A) At least 50%
B) At least 25%
C) At least 75%
D) At least 100%

96. A population consists of all the weights of all defensive tackles on Sociable University's football team. They are: Johnson, 204 pounds; Patrick, 215 pounds; Junior, 207 pounds; Kendron, 212 pounds; Nicko, 214 pounds; and Cochran, 208 pounds. What is the population standard deviation (in pounds)?
97. The weights (in grams) of the contents of several small bottles are 4, 2, 5, 4, 5, 2 and 6. What is the sample variance?
A) 6.92
B) 4.80
C) 1.96
D) 2.33

98. Each person who applies for an assembly job at Robert's Electronics is given a mechanical aptitude test. One part of the test involves assembling a plug-in unit based on numbered instructions. A sample of the length of time it took 42 persons to assemble the unit was organized into the following frequency distribution.

<table>
<thead>
<tr>
<th>Length of Time (in minutes)</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 up to 4</td>
<td>4</td>
</tr>
<tr>
<td>4 up to 7</td>
<td>8</td>
</tr>
<tr>
<td>7 up to 10</td>
<td>14</td>
</tr>
<tr>
<td>10 up to 13</td>
<td>9</td>
</tr>
<tr>
<td>13 up to 16</td>
<td>5</td>
</tr>
<tr>
<td>16 up to 19</td>
<td>2</td>
</tr>
</tbody>
</table>

What is the standard deviation (in minutes)?
A) 3.89
B) 6.01
C) 8.78
D) 17.00

99. The distribution of a sample of the outside diameters of PVC gas pipes approximates a symmetrical, bell-shaped distribution. The arithmetic mean is 14.0 inches, and the standard deviation is 0.1 inches. About 68 percent of the outside diameters lie between what two amounts?
A) 13.5 and 14.5 inches
B) 13.0 and 15.0 inches
C) 13.9 and 14.1 inches
D) 13.8 and 14.2 inches
100. A sample of the daily number of passengers per bus riding the Bee Line commuter route yielded the following information:

<table>
<thead>
<tr>
<th>Number of Passengers</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 up to 5</td>
<td>4</td>
</tr>
<tr>
<td>5 up to 10</td>
<td>9</td>
</tr>
<tr>
<td>10 up to 15</td>
<td>15</td>
</tr>
<tr>
<td>15 up to 20</td>
<td>10</td>
</tr>
<tr>
<td>20 up to 25</td>
<td>2</td>
</tr>
</tbody>
</table>

What is the standard deviation?
A) About 5.2  
B) About 20.0  
C) About 12.9  
D) About 2.3

101. If the sample variance for a frequency distribution consisting of hourly wages was computed to be 10, what is the sample standard deviation?
A) $1.96  
B) $4.67  
C) $3.16  
D) $10.00

102. Based on the Empirical Rule, what percent of the observations will lie above the mean plus two standard deviations?
A) 95%  
B) 5%  
C) 68%  
D) 2.5%

103. Samples of the wires coming off the production line were tested for tensile strength. The statistical results (in PSI) were:

<table>
<thead>
<tr>
<th>Arithmetic mean</th>
<th>500</th>
<th>Median</th>
<th>500</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mode</td>
<td>500</td>
<td>Standard deviation</td>
<td>40</td>
</tr>
<tr>
<td>Quartile deviation</td>
<td>25</td>
<td>Mean deviation</td>
<td>32</td>
</tr>
<tr>
<td>Range</td>
<td>240</td>
<td>Sample size</td>
<td>100</td>
</tr>
</tbody>
</table>

According to the Empirical Rule, the middle 95 percent of the wires tested between approximately what two values?
A) 450 and 550  
B) 460 and 540  
C) 420 and 580  
D) 380 and 620
**Fill-in-the-Blank**

104. What measure of central location uses all of the observations in its calculation? ______________

105. What is the class with the largest number of observations called? ______________

106. If a set of observations contains an extreme value and none of the observations repeat themselves, what is the most representative measure of central location? ______________

107. The value that occurs most often in a set of data is called the ______

108. The weekly sales from a sample of ten computer stores yielded a mean of $25,900; a median $25,000 and a mode of $24,500. What is the shape of the distribution? ______________

109. Which measure of central location requires that the data be ranked before it is possible to determine it? ______________

110. A statistic computed by summing all of the values of a distribution and dividing by the number of values is called: ______________

111. If a distribution is highly skewed, what measure of central location should be avoided? ______________

112. If the n-th root is taken of the product of "n" values, what is the result? ______________

113. What is a characteristic of a population called? ______________

114. A sample revealed that the ages of musicians playing in small local combos are 36, 29, 37, 32, 36 and 75. What is the most appropriate measure of central location to represent the ages of the musicians? ______________

115. What measure of central location cannot be determined if the distribution has an open-ended class? ______________.
116. What is the measure of central location used to determine the average annual percent increase in sales from one time period to another? __________________

117. What is the smallest measure of central location in a positively skewed distribution? __________

118. A small manufacturing company with 52 employees has annual salaries distributed such that the mean is $25,459, the median is $24,798 and the mode is $24,000. An additional foreman is hired at an annual salary of $50,700. What measure of central location that is most affected by the addition of this salary? ________________

119. What is the relationship between the mean and median in a negatively skewed distribution? ________________

120. What is the relationship between the median and the mode in a positively skewed distribution? _______________

121. Five students were given a page of problems with the instructions to solve as many as they could in one hour. Five students solved the following number of problems: 12, 10, 8, 6 and 4. What is the arithmetic mean number of minutes required per problem?________

122. David Electronics had a profit of $10 million in 2002. Profit doubled from 2002 to 2003 and profit increased eight fold from 2003 to 2004. What was the annual geometric mean rate of growth from 2002 to 2004? ______________

123. What is the difference between the largest and the smallest values in a set of data? ________

124. When is the only time the variance equals the standard deviation? __________________

125. According to the Empirical Rule, what percent of the observations lie within plus and minus one standard deviation of the mean? ________

126. What is the positive square root of the standard deviation? ________

127. The capacities of several metal containers are: 38, 20, 37, 64, and 27 liters. What is the range in liters? _____
128. What does the sum of the deviations of each value from the mean equal?  ______________

129. A company studied the commissions paid to furniture salespersons. If the variance is computed, what would be measured the unit of measure?  ______________

130. A study measured the number of hours a light bulb will operate before it burns out. If the variance of this distribution were computed, what would be the unit of measure?  ______________

Use the following to answer questions 131-141.
A sample of five full service gasoline stations, each carrying three grades of gasoline, was taken and the price per gallon (to the nearest cent) was recorded for each grade of gasoline, as shown in the table below.

<table>
<thead>
<tr>
<th>STATION</th>
<th>Gasoline</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unleaded</td>
<td>$2.27</td>
<td>$2.27</td>
<td>$2.27</td>
<td>$2.27</td>
<td>$2.27</td>
<td></td>
</tr>
<tr>
<td>Unleaded Plus</td>
<td>2.36</td>
<td>2.37</td>
<td>2.38</td>
<td>2.38</td>
<td>2.40</td>
<td></td>
</tr>
<tr>
<td>Super Unleaded</td>
<td>2.47</td>
<td>2.49</td>
<td>2.50</td>
<td>2.50</td>
<td>2.59</td>
<td></td>
</tr>
</tbody>
</table>

131. What is the mean price of Unleaded gas?  ________

132. What is the mean price of Unleaded Plus gas?  ________

133. What is the mean price of Super Unleaded gas?  ________

134. What is the median price of Unleaded gas?  ________

135. What is the median price of Unleaded Plus gas?  ________

136. What is the median price of Super Unleaded gas?  ________

137. What is the modal price of Unleaded gas?  ________

138. What is the modal price of Unleaded Plus gas?  ________

139. For Unleaded gas, which measure of central location would be the lowest?

140. For Super Unleaded gas, which measure of central location would be the highest?  ________
141. For Unleaded Plus gas, which measure of central location would not be appropriate to use? __________

Use the following to answer questions 142-145:
Refer to the following:
The weights of a sample of 100 boxes shipped by Air France from New York to Paris are:

<table>
<thead>
<tr>
<th>Weights (pounds)</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 up to 75</td>
<td>4</td>
</tr>
<tr>
<td>75 up to 100</td>
<td>16</td>
</tr>
<tr>
<td>100 up to 125</td>
<td>21</td>
</tr>
<tr>
<td>125 up to 150</td>
<td>46</td>
</tr>
<tr>
<td>150 up to 175</td>
<td>13</td>
</tr>
</tbody>
</table>

142. What is the approximate mode for the grouped data? ______________

143. What is the approximate mean for the grouped data? _______________

144. What is the approximate median for the grouped data? _____________

Multiple Choice

145. The mean for this data is referred to as the
A) Sample mean  
B) Population mean  
C) Estimated mean  
D) Weighted mean

Fill-in-the-Blank

Use the following to answer questions 146-149:
A company's human resource department was interested in the average number of years that a person works before retiring. The sample of size 11 follows:

12 16 18 19 21 21 21 22 24 24 26

146. What is the mode? ______________
147. What is the arithmetic mean? __________

148. What is the median? ___________

149. Based on the values of the arithmetic mean, median, and mode, what is the most likely shape of the distribution? _________________

**Essay**

150. What are the similarities and differences between the mean, the median, and the mode?

151. What are the similarities and differences between the range and the standard deviation?

152. When reporting descriptive statistics for a variable, why should the report include measures of location and dispersion?