Introduction to Probability and Statistics 15th edition Mendenhall Test Bank

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Chapter 02 - Describing Data with Numerical Measures

1. Numerical descriptive measures computed from population measurements are called parameters.
   a. True
   b. False

ANSWER: True
POINTS: 1
QUESTION TYPE: True / False
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2. Numerical descriptive measures computed from sample measurements are called statistics.
   a. True
   b. False

ANSWER: True
POINTS: 1
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3. Two classes, one with 15 students and the other with 25 students, took the same test and averaged 85 points and 75 points, respectively. If the two classes were combined, the overall average score of the 40 students would be 80 points.
   a. True
   b. False

ANSWER: False
POINTS: 1
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4. The population mean, μ, is used to estimate the sample mean, $\bar{x}$.
   a. True
   b. False

ANSWER: False
POINTS: 1
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5. If the sample mean is much larger than the sample median, the data set is said to be skewed to the right.
   a. True

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b. False

ANSWER: True
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6. When data have been grouped (as in a frequency table, a relative frequency histogram, etc.), the class with the highest frequency is called the modal class, and the midpoint of that class is taken to be the mode.

a. True
b. False

ANSWER: True
POINTS: 1
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7. The mode is generally used to describe large data sets.

a. True
b. False

ANSWER: True
POINTS: 1
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8. The mode of a data set or a distribution of measurements, if it exists, is unique.

a. True
b. False

ANSWER: False
POINTS: 1
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9. Mound-shaped data tend to cluster around a middle value.

a. True
b. False

ANSWER: True
POINTS: 1

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10. Jessica has been keeping track of what she spends to eat out. The last week's expenditures for meals eaten out were $15.69, $15.95, $16.19, $20.91, $17.49, $24.53, and $17.66. The mean amount Jessica spends on meals is $18.35.

a. True
b. False

ANSWER: True
POINTS: 1
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11. A data sample has a mean of 87, and a median of 117. The distribution of the data is skewed to the right.

a. True
b. False

ANSWER: False
POINTS: 1
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12. A student scores 89, 75, 94, and 88 on four exams during the semester and 97 on the final exam. If the final is weighted double and the four others weighted equally, the student's final average would be 90.

a. True
b. False

ANSWER: True
POINTS: 1
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13. In a mound-shaped distribution, there is no difference in the values of the mean, and median.

a. True
b. False

ANSWER: True
POINTS: 1
QUESTION TYPE: True / False

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14. *Measures of center* are values around which observations tend to cluster and that describe the location of what in some sense might be called the "center" of a data set.

a. True
b. False

ANSWER: True
POINTS: 1
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15. The median is a measure of center that divides an ordered array of data into two halves; if the data are arranged in ascending order from smallest to largest, all the observations below the median are smaller than or equal to it, while all the observations above the median are equal to it or larger.

a. True
b. False

ANSWER: True
POINTS: 1
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16. The mode is the sum of a data set's minimum and maximum values, divided by 2.

a. True
b. False

ANSWER: False
POINTS: 1
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17. If the variability of a set of data is very small, then the sample variance may be negative.

a. True
b. False

ANSWER: False
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18. When all the numbers in the data set are the same, the standard deviation must be zero.
    a. True
    b. False
ANSWER: True
POINTS: 1
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19. In all cases, the sum of the deviations of the measurements from their mean is 0.
    a. True
    b. False
ANSWER: True
POINTS: 1
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20. The sample variance is approximately the average of the squared deviations of the measurements from their mean.
    a. True
    b. False
ANSWER: True
POINTS: 1
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21. The sample variance calculated with a divisor of n gives a better estimate of the population variance, σ^2, than does the sample variance, s^2, with a divisor of $n - 1$.
    a. True
    b. False
ANSWER: False
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22. The larger the values of the sample variance s^2 and sample standard deviation s, the greater the variability in the data.

a. True

b. False

ANSWER: True
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23. In order to measure the variability in the same units as the original observations, we compute the sample variance.

a. True

b. False

ANSWER: False
POINTS: 1
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24. Measures of variability describe typical values in the data.

a. True

b. False

ANSWER: False
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25. The mean is one of the most frequently used measures of variability.

a. True

b. False

ANSWER: False
POINTS: 1
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26. The range is considered the weakest measure of variability.

a. True

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b. False

ANSWER: True
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27. For large data sets, the range is not an adequate measure of variability.

a. True
b. False

ANSWER: True
POINTS: 1
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28. The value of the standard deviation will always exceed that of the variance.

a. True
b. False

ANSWER: False
POINTS: 1
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29. The standard deviation is expressed in terms of the original units of measurement but the variance is not.

a. True
b. False

ANSWER: True
POINTS: 1
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30. The value of the standard deviation may be either positive or negative, while the value of the variance will always be positive or zero.

a. True
b. False

ANSWER: False
POINTS: 1

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31. The standard deviation is the positive square root of the variance.
    a. True
    b. False
ANSWER: True
POINTS: 1
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32. A sample of 20 observations has a standard deviation of 4. The sum of the squared deviations from the sample mean is 76.
    a. True
    b. False
ANSWER: False
POINTS: 1
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33. The value of the mean times the number of observations equals the sum of all of the observations.
    a. True
    b. False
ANSWER: True
POINTS: 1
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34. In a histogram, the proportion of the total area which must be to the left of the median is less than 0.50 if the distribution is skewed to the left.
    a. True
    b. False
ANSWER: False
POINTS: 1
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HAS VARIABLES: False

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35. In a histogram, the proportion of the total area which must be to the left of the median is more than 0.50 if the distribution is skewed to the right.

a. True
b. False

ANSWER: False
POINTS: 1
QUESTION TYPE: True / False
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36. If two data sets have the same range, the variances in both sets will be the same.

a. True
b. False

ANSWER: False
POINTS: 1
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37. The sum of the squared deviations from the mean is always zero.

a. True
b. False

ANSWER: False
POINTS: 1
QUESTION TYPE: True / False
HAS VARIABLES: False
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38. *Measures of variability* are numbers that indicate the spread or scatter of observations; they show the extent to which individual values in a data set differ from one another and, hence, differ from their central location.

a. True
b. False

ANSWER: True
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39. A parameter and statistic can be used interchangeably.
    a. True
    b. False

ANSWER: False
POINTS: 1
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40. The median is one of the most commonly used measures of variability.
    a. True
    b. False

ANSWER: False
POINTS: 1
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41. For distributions of data that are skewed to the left or right, the median would likely be the best measure of center.
    a. True
    b. False

ANSWER: True
POINTS: 1
QUESTION TYPE: True / False
HAS VARIABLES: False
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42. You are given the data values 5, 10, 15, 20, and 25. If these data were considered to be a population, and you calculated the mean, you would get the same answer as if these data were considered to be a sample from another larger population.
    a. True
    b. False

ANSWER: True
POINTS: 1
QUESTION TYPE: True / False
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43. The value $(n + 1) / 2$ indicates the value of the median in an ordered data set, where n is the number of data values.

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a. True
b. False

ANSWER: False
POINTS: 1
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44. For any distribution, if the mean is equal to the standard deviation, you can infer that the distribution is symmetric.

a. True
b. False

ANSWER: False
POINTS: 1
QUESTION TYPE: True / False
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45. A distribution is said to be skewed to the right if the population mean is larger than the sample mean.

a. True
b. False

ANSWER: False
POINTS: 1
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46. One advantage of using the median as a measure of center is that its value is not affected by extreme values.

a. True
b. False

ANSWER: True
POINTS: 1
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47. A data set in which the mean and median are equal is said to be bimodal data.

a. True
b. False

ANSWER: False

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48. If the mean value of a distribution is 85 and the median is 67, the distribution must be skewed to the right.
    a. True
    b. False
ANSWER: True
POINTS: 1
QUESTION TYPE: True / False
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49. One of the advantages of the standard deviation over the variance as a measure of variability is that the standard deviation is measured in the original units.
    a. True
    b. False
ANSWER: True
POINTS: 1
QUESTION TYPE: True / False
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50. For any distribution, the standard deviation is a measure of variability of the data around the median.
    a. True
    b. False
ANSWER: False
POINTS: 1
QUESTION TYPE: True / False
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51. Suppose the standard deviation for a given sample is known to be 12. If each data value in the sample is multiplied by 3, the standard deviation will be 36.
    a. True
    b. False
ANSWER: False
POINTS: 1
QUESTION TYPE: True / False

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52. Which measure of center is meaningful when the data are qualitative?

a. the mean
b. the median
c. the mode
d. all of the above
e. none of the above

ANSWER: c
POINTS: 1
QUESTION TYPE: Multiple Choice
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53. Which of the following statements is true?

a. When the distribution is skewed to the left, mean > median.
b. When the distribution is skewed to the right, mean < median.
c. When the distribution is symmetric and unimodal, mean = median.
d. When the distribution is symmetric and unimodal, mean = variance.
e. None of these is true.

ANSWER: c
POINTS: 1
QUESTION TYPE: Multiple Choice
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54. Which of the following statements is true for a symmetric distribution?

a. The mean is greater than the median.
b. The mean is less than the median.
c. The mean and median are equal.
d. All of the above.
e. None of the above.

ANSWER: c
POINTS: 1
QUESTION TYPE: Multiple Choice
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55. In a histogram, the proportion of the total area which must be to the right of the mean is:
    a. less than 0.50 if the distribution is skewed to the left
    b. exactly 0.50
    c. more than 0.50 if the distribution is skewed to the right
    d. exactly 0.50 if the distribution is symmetric and unimodal
    e. none of these

ANSWER: d
POINTS: 1
QUESTION TYPE: Multiple Choice
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56. Which of the following statements is true for the following data values: 17, 15, 16, 14, 17, 18, and 22?
    a. The mean, median and mode are all equal.
    b. Only the mean and median are equal.
    c. Only the mean and mode are equal.
    d. Only the median and mode are equal.
    e. The mean, median and mode are all different.

ANSWER: a
POINTS: 1
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
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57. Since the population is always larger than the sample, the population mean:
    a. is always larger than the sample mean
    b. is always smaller than the sample mean
    c. is always larger than or equal to the sample mean
    d. can be smaller than, or larger than, or equal to the sample mean
    e. is always smaller than or equal to the sample mean

ANSWER: d
POINTS: 1
QUESTION TYPE: Multiple Choice
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58. The average score for a class of 35 students was 70. The 20 male students in the class averaged 73. The 15 female students in the class averaged:
    a. 73

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b. 70
c. 66
d. 60
e. 35

ANSWER: c
POINTS: 1
QUESTION TYPE: Multiple Choice
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59. Which of the following statements about the mean is not always correct?

a. The sum of the deviations from the mean is zero.
b. Half of the observations are on either side of the mean.
c. The mean is a measure of the middle (center) of a distribution.
d. The value of the mean times the number of observations equals the sum of all of the observations.
e. None of the above.

ANSWER: b
POINTS: 1
QUESTION TYPE: Multiple Choice
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60. In a histogram, the proportion of the total area which must be to the left of the median is:

a. exactly 0.50
b. less than 0.50 if the distribution is skewed to the left
c. more than 0.50 if the distribution is skewed to the right
d. between 0.25 and 0.75 if the distribution is symmetric
e. all of the above

ANSWER: a
POINTS: 1
QUESTION TYPE: Multiple Choice
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61. Data about qualitative variables can be summarized by:

a. measures of center
b. measures of variability
c. proportions

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d. measures of relative standing
e. all of the above

ANSWER: c
POINTS: 1
QUESTION TYPE: Multiple Choice
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62. Which of the following best describes measures of center?

a. They are numbers around which observations tend to cluster and that describe the location of what in some sense might be called the center of a data set.
b. They are numbers that indicate the spread or scatter of observations and show the extent to which individual values in a data set differ from one another and, hence, differ from their central location.
c. They are numbers that indicate the degree of asymmetry in a frequency distribution.
d. All of the above.
e. None of the above.

ANSWER: a
POINTS: 1
QUESTION TYPE: Multiple Choice
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63. Consider the data set: 5, 6, 7, 11, and 15. Its mean equals:

a. 7.0
b. 8.8
c. 8.1
d. 7.3
e. 9

ANSWER: b
POINTS: 1
QUESTION TYPE: Multiple Choice
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64. Which of the following statements about the median is correct?

a. It is a measure of center that divides an ordered array of data into two halves.
b. If data are arranged in ascending order from smallest to largest, all the observations below the median are smaller than or equal to it, while all the observations above the median are equal to it or larger.
c. If the total number of observations is odd, the median is the middle observation in an ordered array; if

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the total number of observations is even, the median is the average of the two middle values.

d. All of the above.

e. None of the above.

ANSWER: d
POINTS: 1
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65. A random sample from an unknown population had a sample standard deviation of zero. Which one of the following is a reasonable conclusion?

a. The sample range must be zero.

b. An error was made in computing the sample standard deviation. It must always be greater than zero.

c. The population standard deviation must be zero.

d. The population standard deviation must be zero when the mean is zero.

e. None of the above.

ANSWER: a
POINTS: 1
QUESTION TYPE: Multiple Choice
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66. The following data represent a sample of 10 scores on a 20-point statistics quiz: 16, 16, 16, 16, 16, 18, 18, 20, 20, and 20. After the mean, median, range and variance were calculated for the scores, it was discovered that one of the scores of 20 should have been an 18. Which of the following will change when the calculations are redone using the correct scores?

a. mean and range

b. median and range

c. mean and variance

d. range and variance

e. mean, range, median and variance

ANSWER: c
POINTS: 1
QUESTION TYPE: Multiple Choice
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67. Which of the following represents a disadvantage of using the sample range to measure spread or dispersion?

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a. It produces spreads that are too large.
b. The sample range is not measured in the same units as the data.
c. The largest or smallest observation (or both) may be an outlier.
d. All of the above.
e. None of the above.

ANSWER: c
POINTS: 1
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
DATE CREATED: 2/4/2019 3:13 AM
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68. The following ten scores were obtained on a 20-point quiz: 4, 5, 8, 9, 11, 13, 15, 18, 18, and 20. The teacher computed the usual descriptive measures of center (central tendency) and variability (dispersion) for these data and then discovered an error was made. One of the 18's should have been a 16. Which one of the following measures, calculated on the corrected data, would change from the original computation?

a. mean and standard deviation
b. mean and median
c. range and median
d. mean and range.
e. mean, standard deviation, range and median

ANSWER: a
POINTS: 1
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
DATE CREATED: 2/4/2019 3:13 AM
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69. Which of the following statements is true for the following data values: 17, 15, 16, 14, 17, 18, and 22?

a. The mean, median and mode are all equal.
b. Only the mean and median are equal.
c. Only the mean and mode are equal.
d. Only the median and mode are equal.
e. The median and mode are not equal.

ANSWER: a
POINTS: 1
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
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70. Which of the following statements is true?

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a. The sum of the deviations from the mean is always zero.
b. The sum of the squared deviations from the mean is always zero.
c. The standard deviation is always smaller than the variance.
d. The distance between the first and third quartiles is twice the distance between the first and second quartiles.
e. None of these is true.

ANSWER: a
POINTS: 1
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
DATE CREATED: 2/4/2019 3:13 AM
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71. Which of the following is not a measure of variability?
a. the variance
b. the standard deviation
c. the mean
d. the range
e. all are measures of variability

ANSWER: c
POINTS: 1
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
DATE CREATED: 2/4/2019 3:14 AM
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72. If two data sets have the same range:
a. the distances from the smallest to largest observations in both sets will be the same
b. the smallest and largest observations are the same in both sets
c. both sets will have the same variance
d. both sets will have the same interquartile range
e. both sets will have the same mean

ANSWER: a
POINTS: 1
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
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73. A sample of 25 observations has a standard deviation of 4. The sum of the squared deviations from the sample mean is:
a. 21
b. 25

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c. 100
d. 384
e. 400

ANSWER: d
POINTS: 1
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
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74. Numbers that indicate the spread or scatter of observations in a data set are:

a. measures of center
b. measures of location
c. measures of variability
d. measures of shape
e. all of the above

ANSWER: c
POINTS: 1
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
DATE CREATED: 2/4/2019 3:14 AM
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75. The variance is:

a. a mean of absolute deviations
b. a mean of positive and negative deviations
c. a mean of squared deviations
d. a mean of positive deviations
e. no mean at all

ANSWER: c
POINTS: 1
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
DATE CREATED: 2/4/2019 3:14 AM
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76. If a store manager selected a sample of customers and computed the mean income for this sample, he has computed:

a. a parameter
b. a statistic
c. a qualitative value

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d. all of the above
e. none of the above

ANSWER: b
POINTS: 1
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
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77. Which of the following statements is true?

a. The population mean will always be larger than the mean of a sample selected from that population.
b. The population mean will always be larger than the population median.
c. The population mean and the mean of a sample selected from that population will usually be different values.
d. The population mean will always be equal to the population median.
e. All of the above.

ANSWER: c
POINTS: 1
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
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78. A sample of students who have taken a calculus test has a mean score of 78.2, a mode of 67, and a median score of 67. Based on this information, the distribution of test scores is:

a. symmetric
b. skewed to the right
c. skewed to the left
d. bimodal
e. none of the above

ANSWER: b
POINTS: 1
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
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79. Which of the following is the most frequently used measure of variation?

a. the mean
b. the range
c. the mode

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d. the standard deviation
e. the median

ANSWER: d
POINTS: 1
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
DATE CREATED: 2/4/2019 3:14 AM
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80. Which of the following measures is not affected by extreme values in the data?
a. the mean
b. the median
c. the variance
d. the range
e. the standard deviation

ANSWER: b
POINTS: 1
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
DATE CREATED: 2/4/2019 3:14 AM
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81. Suppose that the distribution of actual weight of students in your university or college is thought to be symmetric. If the average weight is 168 pounds, what would the median weight be?
a. larger than 168 pounds
b. smaller than 168 pounds
c. 168 pounds
d. There is not enough information to answer this question.

ANSWER: c
POINTS: 1
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
DATE CREATED: 2/4/2019 3:14 AM
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82. The time required for ten children to learn a particular motor skill was recorded as 9, 15, 23, 20, 16, 15, 24, 18, 10, and 20 minutes.

a. Find the mean time to learn a particular motor skill. Round your answer to the nearest whole number.

_____

b. Find the median time to learn a particular motor skill. Round your answer to the nearest whole number.

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_____

c. Based on the values of the mean and median in parts (a) and (b) above, are the measurements symmetric, skewed to the right or skewed to the left?

_____

Explain.

_____

ANSWER:	17; 17; Symmetric; Since the mean and median values are the same, we conclude that the measurements are symmetric.
POINTS:	1
QUESTION TYPE:	Subjective Short Answer
HAS VARIABLES:	False
STUDENT ENTRY MODE:	Basic
DATE CREATED:	2/4/2019 3:14 AM
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83. You are given the following measurements: 0.10, 0.25, 0.20, 0.15, and 0.16.

a. Multiply each of the values by 100, and calculate the sample mean for the new data. Round your answer to two decimal places.

_____

b. Without actually calculating the sample mean, what was the mean of the original data? Round your answer to three decimal places.

_____

ANSWER:	17.20; .172
POINTS:	1
QUESTION TYPE:	Subjective Short Answer
HAS VARIABLES:	False
STUDENT ENTRY MODE:	Basic
DATE CREATED:	2/4/2019 3:14 AM
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84. A sample of eight doctors was asked how many flu shots they had given to patients this fall. The numbers of flu shots were 6, 3, 5, 24, 2, 6, 0, and 8.

a. Find the sample mean. Round your answer to two decimal places.

_____

b. Find the sample median. Round your answer to two decimal places.

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_____

c. Based on the values of the mean and median in parts (a) and (b) above, are the measurements symmetric, skewed to the right or skewed to the left?

_____

Explain.

_____

ANSWER:	6.75; 5.50; Skewed right; Since the mean is larger than the median, we conclude that the measurements are skewed to the right.
POINTS:	1
QUESTION TYPE:	Subjective Short Answer
HAS VARIABLES:	False
STUDENT ENTRY MODE:	Basic
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85. In assembling a home appliance, workers generally finish the process within 30 minutes to one hour. Occasionally, due to system failures, the assembly process takes a long time, possibly as long as 4 to 5 hours. What is the most appropriate measure of central tendency to use in this case if you want the measure to be representative of most of the observed times?

_____

Why is it the most appropriate measure?

_____

ANSWER:	Median; Median is the most appropriate measure because it is not influenced by extreme values.
POINTS:	1
QUESTION TYPE:	Subjective Short Answer
HAS VARIABLES:	False
STUDENT ENTRY MODE:	Basic
DATE CREATED:	2/4/2019 3:14 AM
DATE MODIFIED:	2/4/2019 3:14 AM

86. The following data represent scores on a 15-point aptitude test: 8, 10, 15, 12, 14, and 13.

a. Compute the **sample mean** for the *original* data.

_____

Subtract 5 from every observation and complete the **sample mean** for the *new* data.

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_____

b. Compute the **sample variance** for the *original* data. Round your answer to one decimal place.

_____

Subtract 5 from every observation and complete the **sample variance** for the *new* data.

_____

c. What effect, if any, does subtracting 5 from every observation have on the sample mean and sample variance?

_____

ANSWER: 12; 7; 6.8; 6.8; The sample mean is shifted to the left (decreased by 5), but the sample variance remains unchanged.
POINTS: 1
QUESTION TYPE: Subjective Short Answer
HAS VARIABLES: False
STUDENT ENTRY MODE: Basic
DATE CREATED: 2/4/2019 3:14 AM
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87. Thirty-three students were asked to rate themselves on whether they were outgoing or not using this five-point scale: 1 = extremely extroverted, 2 = extroverted, 3 = neither extroverted nor introverted, 4 = introverted, or 5 = extremely introverted. The results are shown in the table below:

Rating x_i	1	2	3	4	5
Frequency f_i	1	7	20	5	0

a. Calculate the sample mean. Round your answer to two decimal places.

_____

b. Calculate the median. Round your answer to two decimal places.

_____

c. Calculate the sample standard deviation. Round your answer to two decimal places.

_____

ANSWER: 2.88; 3; 0.70
POINTS: 1
QUESTION TYPE: Subjective Short Answer

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HAS VARIABLES: False
STUDENT ENTRY MODE: Basic
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88. The following data represent the number of small cracks per bar for a sample of eight steel bars:

4 6 10 1 3 1 25 8

a. Find the average number of small cracks per bar. Round your answer to two decimal places.

_____

b. Find the standard deviation for the number of small cracks per bar. Round your answer to two decimal places.

_____

ANSWER: 7.25; 7.85
POINTS: 1
QUESTION TYPE: Subjective Short Answer
HAS VARIABLES: False
STUDENT ENTRY MODE: Basic
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89. Twenty-eight applicants interested in working for the Food Stamp program took an examination designed to measure their aptitude for social work. A stem and leaf plot of the 28 scores appears below, where the first column is the count per branch, the second column is the stem value, and the remaining digits are the leaves.

Count	Stems	Leaves
1	4	6
1	5	9
4	6	3688
6	7	026799
9	8	145667788
7	9	1234788

a. What is the median score? Round your answer to two decimal places.

_____

b. What is the sample mean for this data set? Round your answer to two decimal places.

_____

c. What is the value of the sample standard deviation? Round your answer to two decimal places.

_____

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d. What is the range of this data? Round your answer to two decimal places.

_____

ANSWER:	84.50; 80.64; 12.85; 52.00
POINTS:	1
QUESTION TYPE:	Subjective Short Answer
HAS VARIABLES:	False
STUDENT ENTRY MODE:	Basic
DATE CREATED:	2/4/2019 3:14 AM
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90. Suppose you are given the following set of sample measurements:

–1, 0, 2, 6, 5, 6

a. Calculate the sample mean. Round your answer to one decimal place.

_____

b. Find the median. Round your answer to one decimal place.

_____

c. Find the mode. Round your answer to one decimal place.

_____

d. Calculate the sample variance. Round your answer to one decimal place.

_____

e. Calculate the sample standard deviation. Round your answer to one decimal place.

_____

f. Calculate the range. Round your answer to one decimal place.

_____

g. Is this data symmetric, skewed to the right or skewed to the left?

_____

Justify your answer.

_____

ANSWER:	3; 3.5; 6; 9.6; 3.1; 7; Skewed to the left; The data is skewed to the left since the mean is less than the median.

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POINTS: 1
QUESTION TYPE: Subjective Short Answer
HAS VARIABLES: False
STUDENT ENTRY MODE: Basic
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91. A neighborhood ice cream vendor reports the following sales of single scoop ice cream cones (measured in hundreds of cones) for five randomly selected weeks:

5 4 6 5 3

a. Find the average number of weekly sales of single scoop ice cream cones. Round your answer to one decimal place.

_____

b. Find the median number of weekly sales of single scoop ice cream cones. Round your answer to one decimal place.

_____

c. Find the variance for the weekly sales of single scoop ice cream cones. Round your answer to one decimal place.

_____

ANSWER: 4.6; 5; 1.3
POINTS: 1
QUESTION TYPE: Subjective Short Answer
HAS VARIABLES: False
STUDENT ENTRY MODE: Basic
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92. The following data represent the sales (measured in $10,000) of seven real estate salespersons employed by a local agency:

23 34 56 47 45 60 249

Which measure of center, the mean or the median, would provide a better measure of the average sales of the company?

_____

Explain.

_____

ANSWER: Median; The median would seem to provide a better measure of the average sales

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since it will not be adversely affected by the extreme value of 249. (The mean will be pulled strongly to the right by the extreme value of 249.)

POINTS: 1
QUESTION TYPE: Subjective Short Answer
HAS VARIABLES: False
STUDENT ENTRY MODE: Basic
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93. The following data represent the number of calories in 12-ounce cans of eight popular soft drinks:

124 144 147 146 148 154 150 234

a. Find the median. Round your answer to one decimal place.

_____

b. Find the sample mean. Round your answer to one decimal place.

_____

c. Based on the values in parts (a) and (b) above, are the measurements symmetric, skewed to the right, or skewed to the left?

_____

Explain.

_____

ANSWER: 147.5; 155.9; Skewed right; Since the mean is larger than the median, we conclude that the measurements are skewed to the right.
POINTS: 1
QUESTION TYPE: Subjective Short Answer
HAS VARIABLES: False
STUDENT ENTRY MODE: Basic
DATE CREATED: 2/4/2019 3:14 AM
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94. In a psychological experiment, the time on task was recorded for ten subjects under a 5-minute time constraint. These measurements are in seconds:

182 197 207 272 192 257 247 197 232 237

a. Find the average time on task.

_____

b. Find the median time on task. Round your answer to one decimal place.

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_____

c. If you were writing a report to describe these data, which measure of central tendency would you use?

_____

Explain.

_____

ANSWER:	222; 219.5; Mean; Since there are no unusually large or small observations to affect the value of the mean, we would probably report the mean or average time on task.
POINTS:	1
QUESTION TYPE:	Subjective Short Answer
HAS VARIABLES:	False
STUDENT ENTRY MODE:	Basic
DATE CREATED:	2/4/2019 3:14 AM
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95. You are given $n = 8$ measurements: 13, 11, 15, 16, 14, 14, 13, and 15.

Calculate the range.

_____

Calculate the sample mean. Round your answer to three decimal places.

_____

Calculate the sample variance. Round your answer to three decimal places.

_____

Calculate the standard deviation. Round your answer to three decimal places.

_____

Compare the range and the standard deviation. The range is approximately how many standard deviations? Round your answer to three decimal places.

_____

ANSWER:	5; 13.875; 2.411; 1.553; 3.220
POINTS:	1
QUESTION TYPE:	Subjective Short Answer
HAS VARIABLES:	False
STUDENT ENTRY MODE:	Basic

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96. A sample of $n = 10$ measurements consists of the following values:

15, 12, 13, 16, 11, 12, 14, 15, 11, 13

a. Find the mean. Round your answer to one decimal place.

_____

b. Find the median.

_____

c. Based on the values in parts (a) and (b) above, are the measurements symmetric, skewed to the right, or skewed to the left?

_____

Explain.

_____

d. Find the standard deviation. Round your answer to two decimal places.

_____

e. Find the range.

_____

f. Use the range to approximate s. Round your answer to two decimal places.

_____

g. Is this a good approximation?

_____

ANSWER: 13.2; 13; Skewed to the right; Since the mean is slightly larger than the median, we conclude that the measurements are slightly skewed to the right.; 1.75; 5; 1.25; Yes
POINTS: 1
QUESTION TYPE: Subjective Short Answer
HAS VARIABLES: False
STUDENT ENTRY MODE: Basic
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97. The following data represent the scores for a sample of 10 students on a 20-point chemistry quiz:

16 14 2 8 12 12 9 10 15 13

a. Calculate the median.

_____

b. Calculate the sample mean. Round your answer to one decimal place.

_____

c. Calculate the sample variance. Round your answer to three decimal places.

_____

ANSWER:	12; 11.1; 16.767
POINTS:	1
QUESTION TYPE:	Subjective Short Answer
HAS VARIABLES:	False
STUDENT ENTRY MODE:	Basic
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98. Assume that all employees of a community college received a $150 monthly raise.

a. How would this affect the mean of salaries?

_____

b. How would this affect the standard deviation of salaries?

_____

ANSWER:	The mean will increase by $150; The standard deviation will remain unchanged
POINTS:	1
QUESTION TYPE:	Subjective Short Answer
HAS VARIABLES:	False
STUDENT ENTRY MODE:	Basic
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99. The following values denote the number of customers handled by an optometrist during a random sample of four periods of one hour each: 4, 6, 2, and 5.

a. Find the standard deviation of these values. Round your answer to three decimal places.

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_____

b. Find the range, *R*.

_____

ANSWER: 1.708; 4
POINTS: 1
QUESTION TYPE: Subjective Short Answer
HAS VARIABLES: False
STUDENT ENTRY MODE: Basic
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100. Tchebysheff's Theorem states that: Given a number *k* greater than or equal to 1, and a set of measurements, at least $[1 - (1/k^2)]$ of the measurements in the data set will lie within *k* standard deviations of their mean.

a. True
b. False

ANSWER: True
POINTS: 1
QUESTION TYPE: True / False
HAS VARIABLES: False
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101. The Empirical Rule states that: Given a distribution of measurements that is approximately bell-shaped (mound-shaped), then the interval $\mu \pm \sigma$ contains approximately 68% of the measurements, the interval $\mu \pm 2\sigma$ contains approximately 95% of the measurements, and the interval $\mu \pm 3\sigma$ contains approximately 99.7% of the measurements.

a. True
b. False

ANSWER: True
POINTS: 1
QUESTION TYPE: True / False
HAS VARIABLES: False
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102. The Empirical Rule and Tchebysheff's Theorem can be used to describe data sets.

a. True
b. False

ANSWER: True
POINTS: 1
QUESTION TYPE: True / False
HAS VARIABLES: False

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103. The Empirical Rule can be applied to any numerical data set.
a. True
b. False
ANSWER: False
POINTS: 1
QUESTION TYPE: True / False
HAS VARIABLES: False
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104. For larger sample sizes, a rough approximation for the sample standard deviation s is that $s \approx R / 4$, where R is the range.
a. True
b. False
ANSWER: True
POINTS: 1
QUESTION TYPE: True / False
HAS VARIABLES: False
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105. Since Tchebysheff's Theorem applies to any distribution, it is very conservative.
a. True
b. False
ANSWER: True
POINTS: 1
QUESTION TYPE: True / False
HAS VARIABLES: False
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106. Tchebysheff's Theorem gives a lower bound to the fraction of measurements to be found in an interval constructed as $\bar{x} \pm ks$, where $\bar{x}$ is a sample mean and s is a sample standard deviation.
a. True
b. False
ANSWER: True
POINTS: 1
QUESTION TYPE: True / False
HAS VARIABLES: False
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107. Tchebysheff's Theorem applies only to data sets that have a mound-shaped distribution.

a. True

b. False

ANSWER: False
POINTS: 1
QUESTION TYPE: True / False
HAS VARIABLES: False
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108. While Tchebysheff's Theorem applies to any distribution, regardless of shape, the empirical rule applies only to distributions that are mound-shaped.

a. True

b. False

ANSWER: True
POINTS: 1
QUESTION TYPE: True / False
HAS VARIABLES: False
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109. The mean of forty sales receipts is $69.75 and the standard deviation is $10.25. Using Tchebysheff's Theorem, at least 75% of the sales receipts were between $49.25 and $90.25.

a. True

b. False

ANSWER: True
POINTS: 1
QUESTION TYPE: True / False
HAS VARIABLES: False
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110. According to Tchebysheff's Theorem, at least 96% of observations should fall within 5 standard deviations of the mean.

a. True

b. False

ANSWER: True
POINTS: 1
QUESTION TYPE: True / False
HAS VARIABLES: False
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111. Tchebysheff's Theorem provides us with a measure of shape that focuses on the difference between the

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mode and the mean and then relates it to the standard deviation.

a. True

b. False

ANSWER: False
POINTS: 1
QUESTION TYPE: True / False
HAS VARIABLES: False
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112. The distribution of checking account balances for customers at Independent Bank is known to be mound-shaped with a mean of $1,800 and a standard deviation of $300. Given this information, the percentage of accounts with balances between $1,500 and $2,100 will be approximately 95%.

a. True

b. False

ANSWER: False
POINTS: 1
QUESTION TYPE: True / False
HAS VARIABLES: False
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113. The distribution of dollars paid for home insurance by home owners in Detroit is mound-shaped with a mean equal to $800 every six months, and a standard deviation equal to $120. Based on this information, we can use Tchebysheff's Theorem to determine the percentage of home owners that will pay between $560 and $1,040 for home insurance.

a. True

b. False

ANSWER: True
POINTS: 1
QUESTION TYPE: True / False
HAS VARIABLES: False
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114. The distribution of credit card balances for customers is highly skewed to the right with a mean of $1,200 and a standard deviation of $150. Based on this information, approximately 68% of the customers will have credit card balances between $1,050 and $1,350.

a. True

b. False

ANSWER: False
POINTS: 1
QUESTION TYPE: True / False
HAS VARIABLES: False
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115. A college placement office conducted a survey of 100 engineers who had graduated from Stanford University. For these engineers, the mean salary was computed to be $72,000 with a standard deviation of $8,000. The percentage of these engineers who earn more than $96,000 or less than $48,000 is:

a. approximately 0%
b. at least 5.6% (1/18 of the engineers)
c. at most 5.6% (1/18 of the engineers)
d. at most 11.1% (1/9 of the engineers)
e. at least 11.1% (1/9 of the engineers)

ANSWER: d
POINTS: 1
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
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116. From a sample of size 100, the following descriptive measures were calculated: median = 23, mean = 20, standard deviation = 5, range = 35; seventy-five sample values are between 10 and 30; and ninety-nine sample values are between 5 and 35. If you knew the sample mean, median, and standard deviation were correct, which one of the following conclusions might you draw?

a. The distribution is skewed to the right because the median exceeds the mean.
b. The range must have been calculated incorrectly because it should not be seven times the standard deviation value.
c. The number of sample values between 10 and 30 was miscounted.
d. The number of sample values between 5 and 35 must have been miscounted because all 100 values must be in this interval.
e. All of these.

ANSWER: b
POINTS: 1
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
DATE CREATED: 2/4/2019 3:24 AM
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117. Tchebysheff's Theorem states that the percentage of measurements in a data set that fall within three standard deviations of their mean is:

a. 75%
b. 68%
c. 16%
d. at least 89%
e. at most 80%

ANSWER: d

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POINTS: 1
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
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118. Given a distribution of measurements that is approximately mound-shaped, the Empirical Rule states that the approximate percentage of measurements in a data set that fall within two standard deviations of their mean is approximately:

a. 99%
b. 95%
c. 90%
d. 68%
e. 75%

ANSWER: b
POINTS: 1
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
DATE CREATED: 2/4/2019 3:24 AM
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119. The expression $\bar{x} = \sum f_i x_i / n$, where $n = \sum f_i$, is recognizable as the formula for:

a. the population mean, computed from ungrouped data
b. the sample mean, computed from ungrouped data
c. the population mean, computed from grouped data
d. the sample mean, computed from grouped data
e. none of these

ANSWER: d
POINTS: 1
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
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120. The expression $s^2 = \left[\sum x_i^{\,2} f_i - \left(\sum x_i f_i\right)^2 / n\right] / (n-1); n = \sum f_i$, is recognizable as the formula for:

a. the sample variance, computed from ungrouped data
b. the population variance, computed from ungrouped data
c. the sample variance, computed from grouped data
d. the population variance, computed from grouped data
e. the population variance, computed from ungrouped or grouped data

ANSWER: c
POINTS: 1

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QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
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121. Whenever a statistical population can be described, at least roughly, by the perfectly symmetrical, mound-shaped normal curve, we can estimate the percentages of all population values that lie within specified numbers of standard deviations from the mean with the help of:

a. Tchebysheff's Theorem
b. the empirical rule
c. the interquartile range
d. box plot
e. Tchebysheff's Theorem or the empirical rule

ANSWER: e
POINTS: 1
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
DATE CREATED: 2/4/2019 3:24 AM
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122. The lengths of screws produced by a machine are normally distributed with a mean of 3 inches and a standard deviation of .2 inches. Therefore, we know:

a. that approximately 68 percent of all screws have lengths between 2.8 and 3.2 inches
b. that approximately 95 percent of all screws have lengths between 2.8 and 3.2 inches
c. that just about all screws have lengths between 2.8 and 3.2 inches
d. that approximately 98 percent of all screws have lengths between 2.8 and 3.2 inches
e. none of these

ANSWER: a
POINTS: 1
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
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123. According to Tchebysheff's Theorem, provided only a number $k \geq 1$, regardless of the shape of a population's frequency distribution. The proportion of observations falling within k standard deviations of the mean is:

a. at most $(1 - 1/k)^2$
b. at least $(1 - 1/k)^2$
c. at most $1 - (1/k^2)$
d. at least $1 - (1/k^2)$

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e. exactly $1 - (1/k^2)$

ANSWER: d
POINTS: 1
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
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124. The distribution of actual weight of tomato soup in a 16-ounce can is thought to be mound-shaped with a mean equal to 16 ounces, and a standard deviation equal to 0.25 ounces. Based on this information, between what two values could we expect 95% of all cans to weigh?

a. 15.75 to 16.25 ounces
b. 15.50 to 16.50 ounces
c. 15.25 to 16.75 ounces
d. 15 to 17 ounces
e. 15 to 16 ounces

ANSWER: b
POINTS: 1
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
DATE CREATED: 2/4/2019 3:24 AM
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125. Incomes of workers in an automobile company in Michigan are known to be right-skewed with a mean equal to $36,100. If at least 8/9 of all incomes are in the range of $29,500 to $42,700, and this was based on Tchebysheff's Theorem, what is the standard deviation for the auto workers?

a. $6,500
b. $6,700
c. Approximately $4,755
d. $2,200
e. $2,600

ANSWER: d
POINTS: 1
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
DATE CREATED: 2/4/2019 3:24 AM
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126. When a machine dispensing cola at a bottling plant is working correctly, it dispenses a mean of 12 ounces of cola per bottle with a standard deviation of 0.2 ounces.

a. When the machine is working correctly, what percentage of the bottles will be filled with between 11.6 and 12.4 ounces of cola?

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At least _____.

b. On a particular day, the bottling plant supervisor randomly selects two bottles from among those filled by the machine. One bottle contains 11.8 ounces of cola, and the other contains 12.1 ounces of cola. Based on the contents of these two bottles, what can the supervisor infer (conclude) about the machine's performance?

_____

ANSWER:	0.75; The machine is working correctly
POINTS:	1
QUESTION TYPE:	Subjective Short Answer
HAS VARIABLES:	False
STUDENT ENTRY MODE:	Basic
DATE CREATED:	2/4/2019 3:24 AM
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127. A new manufacturing plant has 20 job openings. To select the best 20 applicants from among the 1,000 job seekers, the plant's personnel office administers a written aptitude test to all applicants. The average score on the aptitude test is 150 points with a standard deviation of 10 points. Assume the distribution of test scores is approximately mound-shaped.

a. What percentage of the test scores will fall between 130 and 170 points?

Approximately _____. (Enter as a decimal percent or use the % sign.)

b. How many applicants will score between 130 and 170 points?

At least _____ applicants.

c. One of the applicants scored 192 points on the test. What might you conclude about this test score?

_____

ANSWER:	75%; 750; The score should be regarded as an outlier.
POINTS:	1
QUESTION TYPE:	Subjective Short Answer
HAS VARIABLES:	False
STUDENT ENTRY MODE:	Basic
DATE CREATED:	2/4/2019 3:24 AM
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128. Thirty-three students were asked to rate themselves on whether they were outgoing or not using this five-point scale: 1 = extremely extroverted, 2 = extroverted, 3 = neither extroverted nor introverted, 4 = introverted, or 5 = extremely introverted. The results are shown in the table below:

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Rating x_i	1	2	3	4	5
Frequency f_i	1	7	20	5	0

a. Find the percentage of measurements in the following intervals:

$\bar{x} - s =$ _____

$\bar{x} + s =$ _____

This interval contains approximately _____% of the data.

$\bar{x} - 2s =$ _____

$\bar{x} + 2s =$ _____

This interval contains approximately _____% of the data.

b. Comment on the shape of the distribution.

_____

ANSWER: 2.18; 3.58; 68; 1.49; 4.27; 95; The data are approximately mound-shaped
POINTS: 1
QUESTION TYPE: Subjective Short Answer
HAS VARIABLES: False
STUDENT ENTRY MODE: Basic
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129. Given the following frequency table:

Rating x_i	0	1	2	3	4	5	6	7	8
Frequency f_i	69	17	6	3	1	2	1	0	1

a. What fraction of the x values fall within two standard deviations of the mean?

_____

Within three standard deviations of the mean?

_____

b. Do the results of part (a) agree with Tchebysheff 's Theorem?

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_____

ANSWER: 0.95; 0.96; Yes
POINTS: 1
QUESTION TYPE: Subjective Short Answer
HAS VARIABLES: False
STUDENT ENTRY MODE: Basic
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130. Suppose the hourly dollar amount of food sold by a Burger King franchise follows an approximately mound-shaped distribution with a mean sales level of $400 per hour and a standard deviation of $60 per hour.

a. What percentage of the working hours does this Burger King franchise sell between $280 and $520 worth of food per hour?

_____

b. Suppose yesterday, during a one-hour period, this Burger King franchise had sales at the 84th percentile. What dollar sales figure does this represent?

_____

ANSWER: 95%; $460
POINTS: 1
QUESTION TYPE: Subjective Short Answer
HAS VARIABLES: False
STUDENT ENTRY MODE: Basic
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131. Twenty-eight applicants interested in working for the Food Stamp program took an examination designed to measure their aptitude for social work. A stem and leaf plot of the 28 scores appears below, where the first column is the count per "branch," the second column is the stem value, and the remaining digits are the leaves.

Count	Stems	Leaves
1	4	6
1	5	9
4	6	3688
6	7	026799
9	8	145667788
7	9	1234788

a. Should the Empirical Rule be applied to this data set?

_____

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b. Use the range approximation to determine an approximate value for the standard deviation.

_____

ANSWER: No; 13
POINTS: 1
QUESTION TYPE: Subjective Short Answer
HAS VARIABLES: False
STUDENT ENTRY MODE: Basic
DATE CREATED: 2/4/2019 3:24 AM
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132. The following data represents the number of minutes an athlete spends training per day.

73 74 76 77 79 79 83 84 88 84 84 85 86
86 87 87 88 91 92 92 93 97 98 98 81 82

The mean and standard deviation were computed to be 85.54 and 6.97, respectively.

a. What percentage of measurements would you expect to be between 71.60 and 99.48? If the data is approximately mound-shaped, use the Empirical Rule to make a prediction.

_____

b. What percentage of the measurements lies in the interval (71.60, 99.48)?

_____

ANSWER: 95%; 100%
POINTS: 1
QUESTION TYPE: Subjective Short Answer
HAS VARIABLES: False
STUDENT ENTRY MODE: Basic
DATE CREATED: 2/4/2019 3:24 AM
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133. For Labrador Retriever dogs, the average weight at 12 months of age is 50 pounds with a standard deviation of 2.5 pounds. What can be said about the proportion of 12 month old Labrador Retrievers that will weigh between 46.25 pounds and 53.75 pounds?

Choose the appropriate rule: _____

Approximately what proportion of weights will fall into the interval described above? If necessary, round your answer to two decimal places.

_____

Explain.

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_____

ANSWER:	Tchebysheff's Theorem; 0.56; Using Tchebysheff's Theorem, since the given interval represents 1.5 standard deviations on each side of the mean, at least 1 - 1/(1.5)^2=0.56 of the weights will lie in the interval.
POINTS:	1
QUESTION TYPE:	Subjective Short Answer
HAS VARIABLES:	False
STUDENT ENTRY MODE:	Basic
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134. A sample of $n = 10$ measurements consists of the following values:

15 12 13 16 11 12 14 15 11 13

a. Can you use Tchebysheff's Theorem to describe this data set?

_____

Why or why not?

_____

b. Can you use the Empirical Rule to describe this data set?

_____

Why or why not?

_____

ANSWER:	Yes; Tchebysheff's Theorem applies to any set of measurements; No; The data is not mound-shaped
POINTS:	1
QUESTION TYPE:	Subjective Short Answer
HAS VARIABLES:	False
STUDENT ENTRY MODE:	Basic
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135. A distribution of measurements is relatively mound-shaped with mean 70 and standard deviation 10.

a. What proportion of the measurements will fall between 60 and 80?

_____

b. What proportion of the measurements will fall between 50 and 90?

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_____

c. What proportion of the measurements will fall between 50 and 80?

_____

d. If a measurement is chosen at random from this distribution, what is the probability that it will be greater than 80?

_____

ANSWER: 68%; 95%; 81.5%; 16%
POINTS: 1
QUESTION TYPE: Subjective Short Answer
HAS VARIABLES: False
STUDENT ENTRY MODE: Basic
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136. A sample of basketball players has a mean height of 75 inches and a standard deviation of 5 inches. You know nothing else about the size of the data or the shape of the data distribution.

Which rule(s) can you use to describe the data?

_____

Explain.

_____

Approximately what proportion of measurements will fall between 60 and 90?

_____

Approximately what proportion of measurements will fall between 65 and 85?

_____

Approximately what proportion of measurements will fall below 65?

_____

ANSWER: Tchebysheff's Theorem; Since nothing is known about the shape of the distribution, you must use Tchebysheff's Theorem to describe the data.; at least $\frac{8}{9}$; at least $\frac{3}{4}$; at most $\frac{1}{4}$
POINTS: 1
QUESTION TYPE: Subjective Short Answer

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HAS VARIABLES: False
STUDENT ENTRY MODE: Basic
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137. A random sample of 100 foxes was examined by a team of veterinarians to determine the prevalence of a particular type of parasite. Counting the number of parasites per fox, the veterinarians found that 65 foxes had no parasites, 20 had one parasite, and so on. A frequency tabulation of the data is given here:

Number of Parasites, x	0	1	2	3	4	5	6	7	8
Number of Foxes, f	65	20	7	3	1	2	1	0	1

What fraction of the parasite counts fall within two standard deviations of the mean?

_____

Within three standard deviations?

_____

Do these results agree with Tchebysheff's Theorem?

_____

ANSWER: 0.95; 0.96; Yes
POINTS: 1
QUESTION TYPE: Subjective Short Answer
HAS VARIABLES: False
STUDENT ENTRY MODE: Basic
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138. In a time study, conducted at a manufacturing plant, the length of time to complete a specified operation is measured for each on $n = 40$ workers. The mean and standard deviation are found to be 15.2 and 1.40, respectively.

a. Describe the sample data using the Empirical Rule.

_____

b. Describe the sample data using Tchebysheff's Theorem.

_____

ANSWER: If the distribution of measurements is mound-shaped, you can apply the Empirical Rule and expect approximately 68% of the measurements to fall into the interval from 13.8 to 16.6, approximately 95% to fall into the interval from 12.4 to 18.0, and approximately 99.7% to fall into the interval from 11.0 to 19.4.; If you doubt that the distribution of measurements is mound-shaped, or if you wish for some

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other reason to be conservative, you can apply Tchebysheff's Theorem and be absolutely certain of your statements. Tchebysheff's Theorem tells you that at least 3/4 of the measurements fall into the interval from 12.4 to 18.0 and at least 8/9 into the interval from 11.0 to 19.4.

POINTS: 1
QUESTION TYPE: Subjective Short Answer
HAS VARIABLES: False
STUDENT ENTRY MODE: Basic
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139. An analytical chemist wanted to use electrolysis to determine the number of moles of cupric ions in a given volume of solution. The solution was partitioned into $n = 30$ portions of 0.2 milliliter each. Each of the $n = 30$ portions was tested. The average number of moles of cupric ions for the $n = 30$ portions was found to be 0.185 mole; the standard deviation was 0.015 mole. Calculate the following intervals:

$(\bar{x} - s, \bar{x} + s)$ = _____

$(\bar{x} - 2s, \bar{x} + 2s)$ = _____

$(\bar{x} - 3s, \bar{x} + 3s)$ = _____

Describe the distribution of the measurements for the $n = 30$ portions of the solution using Tchebysheff's Theorem.

_____

Describe the distribution of the measurements for the $n = 30$ portions of the solution using the Empirical Rule.

_____

ANSWER: (0.170, 0.200); (0.155, 0.215); (0.140, 0.230); If we doubt that the distribution of measurements is mound-shaped, or if no prior information as to the shape of the distribution is available, we use Tchebysheff's Theorem. We would expect 0 of the measurements to fall in the interval 0.17 to 0.20; at least 3/4 of the measurements to fall in the interval 0.155 to 0.215, and at least 8/9 of the measurements to fall in the interval from 0.14 to 0.23.; According to the Empirical Rule, we would expect approximately 68% of the measurements to fall in the interval 0.17 to 0.20, approximately 95% of the measurements to fall in the interval 0.155 to 0.215, and all or almost all the measurements to fall in the interval 0.14 to 0.23.

POINTS: 1
QUESTION TYPE: Subjective Short Answer
HAS VARIABLES: False
STUDENT ENTRY MODE: Basic
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140. The times required to service customers' cars at a repair shop are skewed to the right with a mean of 2.5 hours and a standard deviation of 0.75 hours. What can be said about the proportion of cars whose service time is either less than one hour or more than four hours?

ANSWER: Applying the Tchebysheff 's Theorem, we can say that at most 25% of the cars take less than one hour or more than four hours to service.
POINTS: 1
QUESTION TYPE: Essay
HAS VARIABLES: False
STUDENT ENTRY MODE: Basic
DATE CREATED: 2/4/2019 3:24 AM
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141. The mean and variance of a sample of $n = 25$ measurements are 80 and 100, respectively. Explain in detail how to use Tchebysheff's Theorem to describe the distribution of measurements.

ANSWER: The distribution of measurements is centered about 80, and Tchebysheff's Theorem states: At least 3/4 of the 25 measurements lie within 2 SD of the mean, that is, between 60 to 100. At least 8/9 or of the measurements lie within 3 SD of the mean, that is, between 50 to 110.
POINTS: 1
QUESTION TYPE: Essay
HAS VARIABLES: False
STUDENT ENTRY MODE: Basic
DATE CREATED: 2/4/2019 3:24 AM
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142. The sample z-score is a measure of relative standing defined by: $z = \dfrac{x - \bar{x}}{s}$. It measures the distance between an observation and the mean in units of the standard deviation.

a. True
b. False

ANSWER: True
POINTS: 1
QUESTION TYPE: True / False
HAS VARIABLES: False
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143. z-scores exceeding 3 in absolute value are likely to occur.

a. True
b. False

ANSWER: False
POINTS: 1

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QUESTION TYPE: True / False
HAS VARIABLES: False
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144. Any unusually large observation (as measured by a z-score greater than 3), or any unusually small observation (as measured by a z-score smaller than -3) is considered an outlier.

a. True
b. False

ANSWER: True
POINTS: 1
QUESTION TYPE: True / False
HAS VARIABLES: False
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145. The 10th percentile of a set of measurements is the value which exceeds 90% of the measurements and is less than the remaining 10% of the measurements.

a. True
b. False

ANSWER: False
POINTS: 1
QUESTION TYPE: True / False
HAS VARIABLES: False
DATE CREATED: 2/4/2019 3:24 AM
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146. The difference between the largest and smallest values in an ordered array is called the interquartile range.

a. True
b. False

ANSWER: False
POINTS: 1
QUESTION TYPE: True / False
HAS VARIABLES: False
DATE CREATED: 2/4/2019 3:24 AM
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147. Quartiles divide the values in a data set into four parts of equal size.

a. True
b. False

ANSWER: True
POINTS: 1
QUESTION TYPE: True / False
HAS VARIABLES: False

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148. The interquartile range is the difference between the upper and lower quartiles.
a. True
b. False
ANSWER: True
POINTS: 1
QUESTION TYPE: True / False
HAS VARIABLES: False
DATE CREATED: 2/4/2019 3:24 AM
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149. Expressed in percentiles, the upper quartile is the 75th percentile.
a. True
b. False
ANSWER: True
POINTS: 1
QUESTION TYPE: True / False
HAS VARIABLES: False
DATE CREATED: 2/4/2019 3:24 AM
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150. Measures of relative standing indicate the position of one observation relative to other observations in a set of data.
a. True
b. False
ANSWER: True
POINTS: 1
QUESTION TYPE: True / False
HAS VARIABLES: False
DATE CREATED: 2/4/2019 3:24 AM
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151. The median equals the second quartile.
a. True
b. False
ANSWER: True
POINTS: 1
QUESTION TYPE: True / False
HAS VARIABLES: False
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152. The standard deviation is a measure of relative standing.

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a. True
b. False

ANSWER: False
POINTS: 1
QUESTION TYPE: True / False
HAS VARIABLES: False
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153. If a set of data has 120 values, the value of the 30th percentile will be calculated using the 36th and 37th values in the data, when the data values have been arranged in ascending order.

a. True
b. False

ANSWER: True
POINTS: 1
QUESTION TYPE: True / False
HAS VARIABLES: False
DATE CREATED: 2/4/2019 3:24 AM
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154. The distribution of a set of data is considered to be symmetric if the mean and the second quartile are equal.

a. True
b. False

ANSWER: True
POINTS: 1
QUESTION TYPE: True / False
HAS VARIABLES: False
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155. If the mean value of a set of data is 83.5 and the median is 72.8, then the third quartile will be at least 83.5.

a. True
b. False

ANSWER: False
POINTS: 1
QUESTION TYPE: True / False
HAS VARIABLES: False
DATE CREATED: 2/4/2019 3:24 AM
DATE MODIFIED: 2/4/2019 3:24 AM

156. Assume that 75% of the households in Michigan have incomes of $24,375 or below. Given this information, it is certain that the mean household income is less than $24,375.

a. True
b. False

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ANSWER: False
POINTS: 1
QUESTION TYPE: True / False
HAS VARIABLES: False
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157. The left and right ends of the box in a box and whisker plot represent the 25th and 75th percentiles, respectively.

a. True
b. False

ANSWER: True
POINTS: 1
QUESTION TYPE: True / False
HAS VARIABLES: False
DATE CREATED: 2/4/2019 3:24 AM
DATE MODIFIED: 4/9/2019 7:03 AM

158. The following five-number summary for a sample of size 500 were obtained: Minimum = 250, $Q_1 = 1,200,\ Q_2 = 3,600,\ Q_3 = 4,800,$ and Maximum = 4,950. Based on this information, if you were to construct a box and whisker plot, the value 215 is considered an outlier.

a. True
b. False

ANSWER: False
POINTS: 1
QUESTION TYPE: True / False
HAS VARIABLES: False
DATE CREATED: 2/4/2019 3:24 AM
DATE MODIFIED: 2/4/2019 3:24 AM

159. The following five-number summary for a sample of size 500 were obtained: Minimum = 250, $Q_1 = 1,200,\ Q_2 = 3,600,\ Q_3 = 4,800,$ and Maximum = 4,950. Based on this information, if you were to construct a box and whisker plot, the value corresponding to the right-hand edge of the box would be 4,800.

a. True
b. False

ANSWER: True
POINTS: 1
QUESTION TYPE: True / False
HAS VARIABLES: False
DATE CREATED: 2/4/2019 3:24 AM
DATE MODIFIED: 4/17/2019 1:15 PM

160. The following five-number summary for a sample of size 500 were obtained: Minimum = 250, $Q_1 = 1,200,\ Q_2 = 3,600,\ Q_3 = 4,800,$ and Maximum = 4,950. Based on this information, the distribution of the data

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seems to be symmetric.

a. True

b. False

ANSWER: False
POINTS: 1
QUESTION TYPE: True / False
HAS VARIABLES: False
DATE CREATED: 2/4/2019 3:24 AM
DATE MODIFIED: 2/4/2019 3:24 AM

161. The following five-number summary for a sample of size 500 were obtained: Minimum = 250, $Q_1 = 1,200,\ Q_2 = 3,600,\ Q_3 = 4,800,$ and Maximum = 4,950. Based on this information, if you were to construct a box and whisker plot, the value corresponding to the upper fence is 10,200.

a. True

b. False

ANSWER: True
POINTS: 1
QUESTION TYPE: True / False
HAS VARIABLES: False
DATE CREATED: 2/4/2019 3:24 AM
DATE MODIFIED: 2/4/2019 3:24 AM

162. A sample of 2,500 vehicles in Minnesota showed the following statistics related to the number of accidents per month: $Q_1 = 15,\ Q_2 = 48,\ Q_3 = 62.$ Based on these data, we can infer that the distribution of accidents is skewed.

a. True

b. False

ANSWER: True
POINTS: 1
QUESTION TYPE: True / False
HAS VARIABLES: False
DATE CREATED: 2/4/2019 3:24 AM
DATE MODIFIED: 4/17/2019 1:19 PM

163. Which of the following randomly selected measurements, x, might be considered a potential outlier (i.e., an unusual measurement) if it was selected from the given population?

a. $x = 0$ from a population with $\mu = 0$ and $\sigma = 2$

b. $x = -5$ from a population with $\mu = 1$ and $\sigma = 4$

c. $x = 7$ from a population with $\mu = 3$ and $\sigma = 2$

d. $x = 4$ from a population with $\mu = 0$ and $\sigma = 1$

e. $x = 1$ from a population with $\mu = 0$ and $\sigma = 2$

ANSWER: d
POINTS: 1

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QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
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164. Which one of the values below represents a lower quartile for the data set 23, 24, 21, and 20?

a. 22.0
b. 22.5
c. 20.25
d. 23.5
e. none of these

ANSWER: c
POINTS: 1
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
DATE CREATED: 2/4/2019 3:24 AM
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165. Which one of the values below represents the upper quartile of the data set 10, 12, 16, 7, 9, 7, 41, and 14?

a. 8
b. 15.5
c. 7
d. 24
e. 10

ANSWER: b
POINTS: 1
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
DATE CREATED: 2/4/2019 3:24 AM
DATE MODIFIED: 2/4/2019 3:24 AM

166. Expressed in percentiles, the interquartile range is the difference between the:

a. 80% and 20% values
b. 95% and 45% values
c. 75% and 25% values
d. 70% and 20% values
e. 90% and 10% values

ANSWER: c
POINTS: 1
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
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167. A student took a chemistry exam where the exam scores were mound-shaped with a mean score of 90 and a standard deviation of 64. She also took a statistics exam where the scores were mound-shaped, the mean score was 70 and the standard deviation was 16. If the student's grades were 102 on the chemistry exam and 77 on the statistics exam, then:

a. the student did relatively better on the chemistry exam than on the statistics exam, compared to the other students in each class.
b. the student did relatively better on the statistics exam than on the chemistry exam, compared to the other students in the two classes.
c. the student's scores on both exams are comparable, when accounting for the scores of the other students in the two classes.
d. it is impossible to say which of the student's exam scores indicates the better performance.
e. the student did relatively the same on both exams.

ANSWER: b
POINTS: 1
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
DATE CREATED: 2/4/2019 3:24 AM
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168. Which of the following summary measures is affected most by outliers?

a. the first quartile
b. the second quartile
c. the third quartile
d. the interquartile range
e. the mean

ANSWER: e
POINTS: 1
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
DATE CREATED: 2/4/2019 3:24 AM
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169. An exam is given to both the fourth period class and the sixth period class. If a student's score is at the 30th percentile in the fourth period class but at the 60th percentile in the sixth period class, which one of the following statements is true?

a. Students in the sixth period class generally performed better on the exam than the students in the fourth period class.
b. A person whose score is at the 15th percentile in the fourth period class will have a score at the 30th percentile in the sixth period class.
c. A person whose score is at the 70th percentile in the sixth period class will have a score at the 40th percentile in the fourth period class.

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d. Students in the fourth period class generally performed better on the exam than students in the sixth period class.
e. None of these.

ANSWER: d
POINTS: 1
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
DATE CREATED: 2/4/2019 3:24 AM
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170. The percentage of all observations in a data set that lies between the 30th percentile and the third quartile:

a. equals 30
b. equals 45
c. equals 75
d. equals 85
e. cannot be determined without additional information

ANSWER: b
POINTS: 1
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
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171. A graphical device that highlights the highest and lowest values in a data set, along with a number of other key observations in an ordered array of the data, such as the upper quartile, the middle value (or median), and the lower quartile, is called:

a. a boxplot
b. a five-number summary
c. a dotplot
d. a stem-and-leaf plot
e. a histogram

ANSWER: a
POINTS: 1
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
DATE CREATED: 2/4/2019 3:24 AM
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172. Lily recently took a biochemistry test, and it was reported back to her that her score placed her at the 97th percentile. Therefore:

a. Lily's score has a z-score of 0.97
b. Lily was in the bottom 3% of the students who took the test

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c. Lily scored as high or higher than 97% of the students who took the test
d. ninety-seven students who took the test scored below Lily
e. ninety-seven students who took the test scored the same as Lily

ANSWER: c
POINTS: 1
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
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173. A sample of 50 values produced the following summary statistics: $Q_1 = 10,\ Q_2 = 14.6,\ Q_3 = 16.7,$ and $\bar{x} = 15.3.$ Based on this information, the left and right ends of the box in a box and whisker plot are, respectively,

a. 10 and 14.6
b. 14.6 and 16.7
c. 10 and 16.7
d. 5.3 and 32.0
e. none of these

ANSWER: c
POINTS: 1
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
DATE CREATED: 2/4/2019 3:24 AM
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174. A sample of 600 values produced the following summary statistics: $Q_1 = 35.6,\ Q_2 = 54.2,\ Q_3 = 62.4,$ and $\bar{x} = 56.8.$ Based on this information, the lower fence on a box and whisker plot is:

a. 26.80
b. −4.60
c. 75.80
d. 102.60
e. 56.8

ANSWER: b
POINTS: 1
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
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175. A sample of 600 values produced the following summary statistics:

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$Q_1 = 35.6$, $Q_2 = 54.2$, $Q_3 = 62.4$, and $\bar{x} = 56.8$. Based on this information, upper fence on a box and whisker plot is:

a. 26.80
b. −4.60
c. 75.80
d. 102.60
e. 62.4

ANSWER: d
POINTS: 1
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
DATE CREATED: 2/4/2019 3:24 AM
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176. If a data set has 15 values that have been sorted in ascending order, which value in the data set will be the 25th percentile?

a. the fourth value
b. the third value
c. the second value
d. the first value
e. There is not enough information to answer this question.

ANSWER: a
POINTS: 1
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
DATE CREATED: 2/4/2019 3:24 AM
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177. If the distribution of sales is thought to be symmetric with very little variation, then:

a. the whiskers on a box and whisker plot should be about half as long as the box is wide
b. the width of the box in a box and whisker plot will be very wide but the whisker will be very short
c. the left and right edges of the box in a box and whisker plot will be approximately equal distance from the second quartile
d. all of the above
e. none of these

ANSWER: c
POINTS: 1
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
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178. The following summary statistics were computed from a sample of size 250:
$Q_1 = 9,\ Q_2 = 13,\ Q_3 = 15,$ and $\bar{x} = 10$. Based on this information, which of the following statements is correct?

a. The distribution of the data is slightly right-skewed.
b. The distribution of the data is symmetric.
c. A data value of 20 is an outlier.
d. All of the above.
e. None of these.

ANSWER: e
POINTS: 1
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
DATE CREATED: 2/4/2019 3:24 AM
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179. The following data represent the number of small cracks per bar for a sample of eight steel bars:

4 6 10 1 3 1 25 8

Which, if any, of the observations appear to be outliers? Justify your answer.

_____

ANSWER: The value 25 has a z-score of 2.26 making it a suspect outlier.
POINTS: 1
QUESTION TYPE: Subjective Short Answer
HAS VARIABLES: False
STUDENT ENTRY MODE: Basic
DATE CREATED: 2/4/2019 3:24 AM
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180. Attendance at London Symphony concerts for the past two years showed an average of 3,000 people per performance with a standard deviation of 100 people per performance. Attendance at a randomly selected concert was found to be 3,290. If attendance data is mound-shaped, does the attendance at the selected concert appear to be unusual?

_____

Justify your conclusion.

_____

ANSWER: Yes; The z-score associated with 3,290 is 2.90, indicating that 3,290 is 2.90 standard deviations above the mean. Although the z-score does not exceed 3, it is close enough for one to suspect that 3,290 is an outlier.
POINTS: 1
QUESTION TYPE: Subjective Short Answer

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HAS VARIABLES: False
STUDENT ENTRY MODE: Basic
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181. Consider the following set of measurements: 6, 3, 5, 14, 2, 6, 0, and 8.

a. Find the 25th percentile:

_____,

Find the 50th percentile:

_____,

Find the 75th percentile:

_____.

b. What is the value of the interquartile range?

_____

ANSWER: 2.25; 5.5; 7.5; 5.25
POINTS: 1
QUESTION TYPE: Subjective Short Answer
HAS VARIABLES: False
STUDENT ENTRY MODE: Basic
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182. Consider the following set of measurements:

5.4, 5.9, 3.5, 4.1, 4.6, 2.5, 4.7, 6.0,
5.4, 4.6, 4.9, 4.6, 4.1, 3.4, 2.2

You may use the Data Analysis tool if you want.

a. Find the 25th percentile:

_____,

Find the 50th percentile:

_____,

Find the 75th percentile:

_____.

b. What is the value of the interquartile range?

_____

ANSWER: 3.5; 4.6; 5.4; 1.9

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POINTS: 1
QUESTION TYPE: Subjective Short Answer
HAS VARIABLES: False
STUDENT ENTRY MODE: Basic
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183. Twenty-eight applicants interested in working for the Food Stamp program took an examination designed to measure their aptitude for social work. A stem-and-leaf plot of the 28 scores appears below, where the first column is the count per *branch*, the second column is the stem value, and the remaining digits are the leaves.

Count	Stems	Leaves
1	4	6
1	5	9
4	6	3688
6	7	026799
9	8	145667788
7	9	1234788

What is the value of the first quartile?

Q1 = _____

What is the value of the third quartile?

Q3 = _____

What is the interquartile range?

IQR = _____

Find the lower fence.

_____

Find the upper fence.

_____

Construct a boxplot for this data.

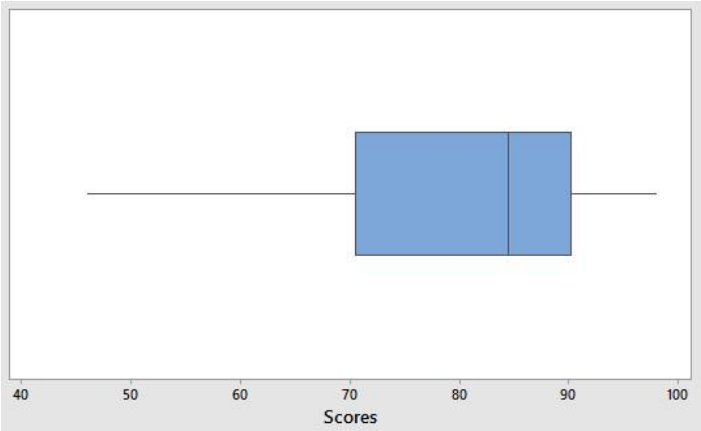
Does the boxplot indicate the presence of any outliers?

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_____

ANSWER: 70.5; 90.25; 19.75; 40.875; 119.875



No

POINTS: 1
QUESTION TYPE: Subjective Short Answer
HAS VARIABLES: False
STUDENT ENTRY MODE: Basic
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184. The following data represent the number of calories in 12 ounce cans of eight popular soft drinks:

124 144 147 146 148 154 150 234

Find the lower fence.

_____

Find the upper fence.

_____

Construct a boxplot for this data.

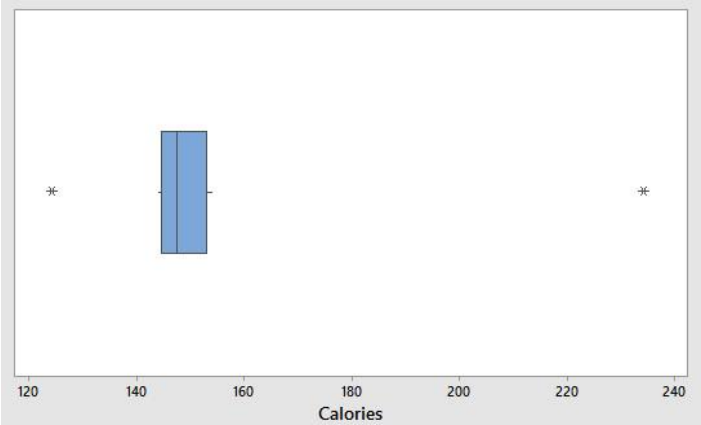
Does the boxplot indicate the presence of any outliers?

_____

ANSWER: 131.75; 165.75

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Yes

POINTS: 1
QUESTION TYPE: Subjective Short Answer
HAS VARIABLES: False
STUDENT ENTRY MODE: Basic
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185. The following data represent the scores for a sample of 10 students on a 20-point chemistry quiz:

16 14 2 8 12 12 9 10 15 13

Calculate the z-score for the smallest and largest observations.

Smallest: _____

Largest: _____

Is either of these observations unusually large or unusually small?

_____

ANSWER: -2.222; 1.197; Yes
POINTS: 1
QUESTION TYPE: Subjective Short Answer
HAS VARIABLES: False
STUDENT ENTRY MODE: Basic
DATE CREATED: 2/4/2019 3:24 AM
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186. Two students are enrolled in different sections of an introductory statistics class at a local university. The first student, enrolled in the morning section, earns a score of 76 on a midterm exam where the class mean was 64 with a standard deviation of 8. The second student, enrolled in the afternoon section, earns a score of 72 on a midterm exam where the class mean was 60 with a standard deviation of 7.5. If the scores on the midterm exams are normally distributed, which student scored better relative to his or her classmates?

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_____

Explain.

_____

ANSWER:	The second student; The student in the afternoon section scored better relative to his/her classmates since that student's z-score is larger.
POINTS:	1
QUESTION TYPE:	Subjective Short Answer
HAS VARIABLES:	False
STUDENT ENTRY MODE:	Basic
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187. If the 90th and 91st observations in a set of 100 data values are 158 and 167, respectively, then the 90th percentile value is:

_____

ANSWER:	166.1
POINTS:	1
QUESTION TYPE:	Subjective Short Answer
HAS VARIABLES:	False
STUDENT ENTRY MODE:	Basic
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188. If the 18th and 19th observations in a set of 25 data values are 42.6 and 43.8, then the 70th percentile value is:

_____

ANSWER:	42.84
POINTS:	1
QUESTION TYPE:	Subjective Short Answer
HAS VARIABLES:	False
STUDENT ENTRY MODE:	Basic
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