TRUE/FALSE  [1 point each]
Indicate whether the sentence or statement is true or false.

____ 1. To establish a cause-and-effect relation between two variables, a researcher should use the experimental research method.

____ 2. The reading ability of 2nd-grade students is classified as high, medium, or low. This classification involves measurement on a nominal scale.

____ 3. If a researcher measures two individuals on an ordinal scale, it is impossible to determine which individual has the larger score.

____ 4. To compute \( \sum x^2 \), you first sum the scores and then square the total.

____ 5. A professor recorded the academic major for each student in an introductory psychology class. If these data were organized in a frequency distribution table, the first column would be a list of academic majors.

____ 6. In a frequency distribution table, \( N \) can be obtained by counting the number of values listed in the \( X \) column.

____ 7. In a grouped frequency distribution table, all of the class intervals should have exactly the same width.

____ 8. In a grouped frequency distribution table, the bottom value in each class interval should be a multiple of the interval width.

____ 9. In a frequency distribution graph, the frequency values are presented on the vertical axis and the scores (or measurement categories) are presented on the horizontal axis.

____ 10. A frequency distribution histogram is best suited for data measured on a nominal scale.

____ 11. A negatively skewed distribution has a tail on the left side of the graph.

____ 12. The scores for a very easy exam would probably form a negatively skewed distribution.

____ 13. A sample of \( n = 6 \) scores has mean \( \bar{x} = 8 \). The scores in the sample must sum to \( \sum x = 48 \).

____ 14. After each score in a population is multiplied by 3 the mean is found to be \( \mu = 90 \). Based on this information, you can conclude that the original mean was \( \mu = 30 \).

____ 15. A distribution with a mean \( \mu = 50 \) and a median of 70 probably is positively skewed.

____ 16. On a 50-point exam Tom has a score of \( X = 23 \). This means that Tom scored below the median.

____ 17. In a published report of research results, a sample mean is typically identified by the letter \( M \).

____ 18. If a constant is added to every score in a distribution, then the standard deviation will remain unchanged.

____ 19. The scores in a sample tend to be less variable than the scores in the population from which the sample was obtained.

____ 20. For any distribution, \( \sum (X - \mu)^2 \) will always equal zero.

____ 21. In a distribution with \( \mu = 40 \), the largest score is \( X = 45 \) and the smallest score is \( X = 35 \). For this distribution, the standard deviation cannot be greater than 5.
22. A positive z-score always corresponds to a score greater than the mean.
23. For any population, a z-score of -2.00 indicates a more extreme location (farther from the mean) than a z-score of +1.00.
24. In a distribution with $\mu = 40$ and $\sigma = 12$, a z-score of $z = -0.50$ corresponds to a score of $X = 46$.
25. For any population, a z-score of +1.00 corresponds to a location exactly 1 point above the mean.
26. In a distribution with $\mu = 80$, a score of $X = 70$ corresponds to $z = -0.50$. The standard deviation for this population is $\sigma = 5$.
27. On an exam, Tom scored 8 points above the mean and had a z-score of +2.00. The standard deviation for the set of exam scores must be $\sigma = 4$.
28. Whenever a population is transformed into z-scores, $\sum z = 0$. 
Multiple Choice  [2 points each]
Identify the letter of the choice that best completes the statement or answers the question.

____ 29. The relation between a statistic and a parameter is the same as the relation between

A  A sample and a population  
B  A dependent variable and an independent variable  
C  Descriptive statistics and inferential statistics  
D  An operational definition and a hypothetical construct

____ 30. A characteristic, usually a numerical value that describes an entire population of scores is a __________.

A  Parameter  
B  Statistic  
C  Variable  
D  Constant

____ 31. In an experiment, the researcher manipulates the ______ variable and observes or measures the ______ variable.

A  Population, sample  
B  Sample, population  
C  Independent, dependent  
D  Dependent, independent

____ 32. What is the first step to be performed in the following mathematical expression \( \sum (x + 2)^2 \) ?

A  Square each value  
B  Sum the squared values  
C  Add 2 points to each value  
D  Square the sum of the values

____ 33. For the following scores, what is \( \sum x^2 \) ? Scores: 2, 0, 4, 2

A  16  
B  24  
C  64  
D  (24)^2 = 576

\[
\begin{array}{cc}
X & f \\
5 & 1 \\
4 & 2 \\
3 & 4 \\
2 & 1 \\
1 & 2 \\
\end{array}
\]
34. Refer to the table above. For these data, \( \sum x \) is

A 10  
B 15  
C 29  
D Cannot be determined from the table

35. A distribution of scores is being organized in a grouped frequency distribution table with an interval width of 2 points. If the lowest score in the distribution is \( X = 41 \), then the bottom interval in the table should be ______.

A 40–42  
B 41–43  
C 40–41  
D 41–42

The following table shows a frequency distribution of exam scores.

<table>
<thead>
<tr>
<th>X</th>
<th>f</th>
</tr>
</thead>
<tbody>
<tr>
<td>70–74</td>
<td>3</td>
</tr>
<tr>
<td>65–69</td>
<td>4</td>
</tr>
<tr>
<td>60–64</td>
<td>8</td>
</tr>
<tr>
<td>55–59</td>
<td>2</td>
</tr>
<tr>
<td>50–54</td>
<td>1</td>
</tr>
<tr>
<td>45–49</td>
<td>1</td>
</tr>
</tbody>
</table>

36. Refer to the table above this is a grouped frequency distribution table where the scores have been grouped into class intervals using an interval width of ________.

A 4 points  
B 5 points  
C 9 points  
D 10 points

The following graph shows a frequency distribution of quiz scores.

37. Refer to the graph above. This is an example of a ________ distribution.

A Symmetrical  
B Positively skewed  
C Negatively skewed  
D Normal
38. A sample has mean of \( \bar{x} = 30 \). If one score with a value of \( x = 10 \) is removed from the sample, what effect will it have on the sample mean?

A. The sample mean will increase.
B. The sample mean will decrease.
C. The sample mean will remain the same.
D. Cannot be determined from the information given

39. Which of the following is a property of the mean?

A. Changing the value of a score will change the value of the mean.
B. Adding a constant to each score will add the same constant to the mean.
C. Multiplying each score by a constant will multiply the mean by the same constant.
D. All of the above

40. A sample of \( n = 20 \) scores has mean \( \bar{x} = 55 \). After one score is removed from the sample, the mean for the remaining scores is found to be \( \bar{x} = 51 \). From this information you can conclude that the removed score was ______.

A. Greater than 55
B. Less than 55
C. It is impossible to estimate the magnitude of the score.

41. For a perfectly symmetrical distribution with \( \mu = 30 \), the median would have a value _____.

A. Equal to 30
B. Greater than 30
C. Less than 30
D. Cannot be determined from the information given

42. A distribution is positively skewed. Which is the most probable order for the three measures of central tendency?

A. Mean = 40, median = 50, mode = 60
B. Mean = 60, median = 50, mode = 40
C. Mean = 40, median = 60, mode = 50
D. Mean = 50, median = 50, mode = 50

43. For any distribution, you can be sure that at least one individual has a score equal to the ______.

A. Mean
B. Median
C. Mode
D. All of the above

44. Which of the following deviation scores correspond to the score that is farthest away from the mean?

A. 0
B. 5
C. −5
D. −10
45. The symbol SS stands for the ______.
   A  Sum of squared scores
   B  Sum of squared deviations
   C  Sum of scores, squared
   D  Sum of the deviations, squared

46. Population standard deviation is identified by the symbol ______.
   A  s
   B  s^2
   C  σ
   D  σ^2

47. What is the relationship between the standard deviation and variance?
   A  Standard deviation equals the variance divided by N.
   B  Standard deviation equals the variance divided by n – 1.
   C  Variance is the square root of standard deviation.
   D  Standard deviation is the square root of variance.

48. A population has μ = 40 and σ = 8. If each score is multiplied by 2, the new standard deviation will be ______.
   A  4
   B  8
   C  16
   D  Insufficient information, cannot be determined

49. A population of scores has μ = 20 and σ = 5. If every score in the population is multiplied by 2, then the new values for the mean and standard deviation would be ______.
   A  μ = 20 and σ = 5
   B  μ = 40 and σ = 5
   C  μ = 20 and σ = 10
   D  μ = 40 and σ = 10

50. If a population has a mean of μ = 24 with σ = 4 and N = 10, then Σ(X – μ) has a value of ______.
   A  0
   B  16
   C  2.5
   D  400

51. What is the value of SS for the following set of scores? 5, 6, 1.
   A  144
   B  62
   C  14
   D  None of the above
52. Which of the following samples would have the largest value for sample variance?

A  1, 3, 5
B  11, 13, 15
C  51, 53, 55
D  101, 103, 105
E  All the samples would have exactly the same variance.

53. The smallest score in a population is \( X = 5 \) and the largest score is \( X = 10 \). Based on this information, you can conclude that ______.

A  The population mean is somewhere between 5 and 10.
B  The population standard deviation is smaller than 6
C  All of the above
D  None of the above

54. If you have a score of \( X = 75 \) on an exam, which set of parameters would give you the highest position within the class?

A  \( \mu = 70 \) and \( \sigma = 5 \)
B  \( \mu = 70 \) and \( \sigma = 15 \)
C  \( \mu = 60 \) and \( \sigma = 5 \)
D  \( \mu = 60 \) and \( \sigma = 15 \)

55. A population of scores has \( \sigma = 20 \). In this population, a score of \( X = 80 \) corresponds to \( z = +0.25 \). What is the population mean?

A  70
B  75
C  85
D  90

56. Under what circumstances would a score that is 15 points above the mean be considered an extreme score?

A  When the population mean is much larger than 15
B  When the population standard deviation is much larger than 15
C  When the population mean is much smaller than 15
D  When the population standard deviation is much smaller than 15

57. A \( z \)-score of \( z = -0.25 \) indicates a location that is ______.

A  At the center of the distribution
B  Slightly below the mean
C  Far below the mean in the extreme left-hand tail of the distribution
D  The location depends on the mean and standard deviation for the distribution.
58. For a population with \( \sigma = 4 \), an individual with a deviation score of +2 would have a z-score of _____.

A  +2.00  
B  +8.00  
C  +0.50  
D  Cannot be determined without knowing the population mean

59. Suppose you earned a score of \( X = 45 \) on an exam. Which set of parameters would give you the highest grade?

A  \( \mu = 50 \) and \( \sigma = 2 \)  
B  \( \mu = 50 \) and \( \sigma = 10 \)  
C  \( \mu = 55 \) and \( \sigma = 2 \)  
D  \( \mu = 55 \) and \( \sigma = 10 \)

60. A population with \( \mu = 85 \) and \( \sigma = 12 \) is transformed into z-scores. After the transformation, the population of z-scores will have a mean of _____.

A  \( \mu = 85 \)  
B  \( \mu = 1.00 \)  
C  \( \mu = 0 \)  
D  Cannot be determined from the information given

61. For a symmetrical population with \( \mu = 100 \) the z-score corresponding to \( X = 120 \) would be ______.

A  1.20  
B  2.00  
C  1.00  
D  Cannot be determined from the information given

62. One advantage of transforming \( X \) values to z-scores is ______.

A  All negative numbers are eliminated  
B  The distribution is transformed to a normal shape  
C  All scores are moved closer to the mean  
D  All of the above  
E  None of the above