Chapter 2: Basic Statistics, Sampling Error, and Confidence Intervals

Multiple Choice

1. Which notation represents a population mean:
a. M
b. μ
c. z
d. s
Ans: a

2.Which notation represents a sample standard deviation:
a. M
b. μ
c. z
d. s
Ans: d

3. When different sets of data of the same size are randomly chosen from a population, the resulting variation in values is called _____.:
a. confidence interval
b. sampling error
c. standard deviation
d. magnitude of error
Ans: b

4. The formula for the sample mean is ∑X/N. When N increases and ∑X stays the same, the:
a. sample mean increases.
b. sample mean decreases.
c. population mean increases.
d. population mean decreases.
Ans: b

5. If a list of math exam scores is provided, what would the best estimate of a randomly selected student's math score:
a. mode
b. median
c. mean
d. sum of the squared deviations
Ans: c

6. The inclusion of an extreme outlier will affect which statistic the most:
a. mode
b. median
c. mean
d. sum of the squared deviations
Ans: c

7. The mean, median, and mode are the same value for what type of distribution:
a. skewed
b. normal
c. uniform
d. triangular
Ans: b

8. What is the minimum value for the sum of the squared deviations:
a. -∞
b. -1
c. 0
d. ∞
Ans: c

9. The statistic calculated by summing the deviations, squaring the result, and then dividing by the sample size minus one is the sample:
a. standard deviation
b. variance
c. mean
d. median
Ans:b

10. The proportion of the area of a normal distribution greater than 12.1% is z=____. Use Appendix A of your textbook:
a. 0.30
b. 0.97
c. 1.17
d. 2.25
Ans: c

11. As N increases, the standard error of the mean:
a. increases

b. decreases
c. remains constant
d. varies randomly
Ans: b

12. As the standard deviation decreases, the standard error of mean:
a. increases
b. decreases
c. remains constant
d. varies randomly
Ans: b

13. The difference between the population mean and the sample mean is called the:
a. estimation error
b. standard error
c. magnitude of the difference
d. prediction error
Ans: a

14. At what degrees of freedom is a *t* distribution similar to a normal distribution:
a. 25
b. 50
c. 75
d. 100
Ans: d

15. Which of the following statistics is <u>not</u> used in the calculation of a confidence interval:
a. population mean
b. standard error
c. critical value
d. sample mean
Ans: d

True/False

1. The degrees of freedom for a statistic provides the number of independent pieces of information.
Ans: True

2. Dividing the sum of squares by the sample size overestimates the population variance.
Ans: False

3. Usually, we know the population mean and population standard deviation for a given data set.
Ans: False

4. As the degrees of freedom for the *t* distribution increases, the shape of the distribution becomes leptokurtic.
Ans: True

5. The definition of a confidence interval is a 95% chance of including the population parameter between the upper and lower limits.
Ans: False

Short Answer

1. Calculate the sample mean for the following values of systolic blood pressure: 130, 152, 120, 107, 110, 143.
Ans: 127.00

2. Calculate the sample standard deviation for the following values of systolic blood pressure: 130, 152, 120, 107, 110, 143.
Ans: 18.04

3. Compute the sample standard error of the mean for the following values of systolic blood pressure: 130, 152, 120, 107, 110, 143.
Ans: 7.37

4. Calculate the 95% confidence interval of the mean for the following values of systolic blood pressure: 130, 152, 120, 107, 110, 143.
Ans: [108.06, 145.94]

5. Which scores are used to determine the proportion of subjects whose test scores lie between –X and +X?
Ans: z scores

Essay

1. Contrast the standard deviation and the standard error.
Ans: SD shows the variation around a single measurement of the mean. SE shows the variation around the average of repeated measurements of the mean.

2. What is the meaning of a confidence interval?
Ans: Whether in a sample or a population, the CI is a range of values above and below a sampl statistic that is likely to include that statistic. For example, in a 95% CI, if hundreds of intervals were constructed from random sampling, we would expect that 95% of the CI's would contain the sample statistic.