DCIT 405

QUIZ 3

1. The reason for which usually the sample (n-1) is used in calculation of variance instead of the population (n) is that.
   i. The sample introduces a biased estimate in the variance calculation
   ii. We want to make estimates about the sample based on the population
   iii. The sample introduces an unbiased estimate in the variance calculation
   iv. We want to make estimates about the population based on the sample

   a.i and ii b. ii and iii c. iii and iv d. All the above

2. ……. is a smoothed version of the histogram
   a. Contour plot
   b. Scatter plot
   c. Density plot
   d. Box plot

3. The equation for normal distribution of a population can be written as
   a. Z = (obs - mean) / SD
   b. Z = obs + mean
   c. Z = (SD - mean) / obs
   d. Z = obs / mean

   where SD = standard deviation, obs = observation

Scenario

A lightbulb manufacturing company is interested in evaluating the quality of a new production line. They want to ensure that the products meet specific longevity standards. The quality control team selects a random subset of products from the new line and subjects them to rigorous testing to estimate the average lifespan of the lightbulbs

4. What is the term for the subset of products that the quality control team selects for testing?
   a. Parameter
   b. Population
   c. Sample
   d. Variable

5. What is the term given to all products from the new line?
   a. Parameter
   b. Population
   c. Sample
   d. Variable

6. According to the central limit theorem, which of the following is/are needed to obtain a normal sampling distribution?
    i. Large sample size
    ii. Sample is independent
    iii. Population is skewed
    iv. Population is finite
    a. ii and iii b. i and iv c. i and ii d. All the above
7. The standard error for a population is calculated as
    a. $\frac{\sigma}{\sqrt{n}}$
    b. $\frac{\sigma^2}{n}$
    c. $n \cdot \sigma^2$
    d. $n \cdot \sqrt{\sigma}$
8. If the sample size is increased, the standard error is expected to
    a. Increase
    b. Decrease
    c. Stay the same
    d. Reduce to zero
9. The formula for the variance of the sample mean can be written as
    a. $\frac{1}{n} Var\left(\sum_{i=1}^{n} X_i\right)$
    b. $\frac{1}{n} Var\left(\sum_{i=1}^{n} X_i^2\right)$
    c. $\frac{1}{n^2} Var\left(\sum_{i=1}^{n} X_i\right)$
    d. $\frac{1}{n^2} Var\left(\sum_{i=1}^{n} X_i^2\right)$
10. In hypothesis testing, it is assumed that the null hypothesis is
    a. True
    b. False
11. Which of the following statements is true about a normal distribution?
    a. The mean and standard deviation are always equal
    b. The mean determines the center of the distribution
    c. A normal distribution is always skewed
    d. A normal distribution is discrete
12. How is the variance of the sum of n independent observations calculated?
    a. $n \cdot \sigma$
    b. $n \cdot \sigma^2$
    c. $\frac{\sigma^2}{n}$
    d. $\frac{\sigma}{n}$

13. What does a 95% confidence interval indicate?
    a. There is a 95% probability the interval contains the sample mean.
    b. There is a 95% probability the interval contains the population mean.
    c. The interval always contains the population mean.
    d. We are 95% confident the interval contains the population mean.
14. When is the t-distribution used instead of the normal distribution?
    a. For large samples
    b. For known population variances
    c. For small samples or unknown population variance
    d. For discrete data
15. What is the shape of the sampling distribution of the mean for a sufficiently large sample?
    a. Skewed left
    b. Skewed right
    c. Bell-shaped
    d. Uniform
16. What method is used to calculate probabilities in a normal distribution?
    a. Sampling
    b. Bootstrapping
    c. Regression
    d. Standardizing
17. What is the standard error for a population with SD = 20 and sample size = 25?
    a. 4
    b. 5
    c. 3
    d. 6
18. What is the sampling distribution?
    a. Distribution of a population
    b. Theoretical set of all possible sample means
    c. Observed data in experiments
    d. Standard deviation of population data
19. …… occurs when measurements are systematically in error because they are not representative of the full population
    a. Variance
    b. Standard Deviation
    c. Bias
    d. Standard Error
20. Information about samples is observed, and information about large populations is often …….. from smaller samples.
    a. Inferred
    b. Sampled
    c. Analyzed
    d. Deduced

1.