Introduction to Statistics
Probability and Inference Quiz

Instructions:

- Answer all questions.

- For Questions 1–5, choose the best option.

- For Questions 6–8, mark True or False.

- For Questions 9–10, write detailed answers with calculations where appropriate.

1. If $P(A) = 0.3$ and $P(B) = 0.4$, and A and B are independent events, what is $P(A \cap B)$?

    (A) 0.70

    (B) 0.12

    (C) 0.10

    (D) 0.58

2. The Central Limit Theorem states that:

    (A) All populations are normally distributed

    (B) Sample means approach a normal distribution as sample size increases

    (C) Larger samples always have smaller means

    (D) The median equals the mean in all distributions

3. A Type I error occurs when:

    (A) Failing to reject a false null hypothesis

    (B) Rejecting a true null hypothesis

    (C) The sample size is too small

    (D) The p-value is greater than alpha

4. Which measure of central tendency is most resistant to outliers?

    (A) Mean

    (B) Median

    (C) Mode

    (D) Range

5. A 95% confidence interval means:

   (A) 95% of the data falls within the interval

   (B) There is a 95% probability the true parameter is in this specific interval

   (C) 95% of similarly constructed intervals would contain the true parameter

   (D) The sample mean is 95% accurate

6. The standard deviation of a sampling distribution is called the standard error. (True/False)

7. A p-value of 0.03 means there is a 3% chance the null hypothesis is true. (True/False)

8. Correlation implies causation between two variables. (True/False)

9. Explain the difference between descriptive and inferential statistics. Provide examples of when each would be appropriate and discuss the role of sampling in making inferences about populations.

10. Describe the process of hypothesis testing, including the null and alternative hypotheses, significance level, p-value, and decision rules. Use an example to illustrate each step.