Test 1 Multiple Choice

1.What is the primary purpose of the Paired T-Test?
A) To determine the relationship between two variables
B) To compare the means of two independent samples
C) To compare the means of two related samples
D) To calculate the variance of one sample

2.Which of the following datasets is appropriate for a Paired T-Test?
A) Exam scores of two different classes
B) Blood pressure before and after medication for the same patients
C) Gender distribution in a population
D) Satisfaction ratings from two independent groups

3.The Paired T-Test is used when the data is:
A) Categorical
B) Ordinal
C) Interval/Ratio
D) Nominal

4.In the Paired T-Test formula, what does $\bar{d}$ represent?

A) The mean of the first and second dataset

B) The mean of the differences between paired samples

C) The total variance of the two datasets

D) Degrees of freedom

5.In which condition is the Paired T-Test not appropriate?

A) The differences follow a normal distribution

B) The samples are paired

C) The data is nominal

D) Observations are paired

6.Which of the following is required to perform a Paired T-Test?

A) Homogeneity of variance

B) Independent samples

C) Paired observations

D) Non-normal distribution

7.What type of t-distribution is used for the critical values in a Paired T-Test?
A) Degrees of freedom = n−1n - 1n−1
B) Degrees of freedom = nnn
C) Degrees of freedom = n+1n + 1n+1
D) It does not use degrees of freedom

8.In the Paired T-Test formula, what does n\sqrt{n}n represent?
A) Standard deviation of the paired differences
B) Square root of the sample size
C) Variance of the differences
D) Mean of the two samples

9.If the computed t-value is higher than the critical t-value, what is the conclusion?
A) Accept the null hypothesis
B) Reject the null hypothesis
C) Data is invalid
D) Results are inconclusive

10. What is the null hypothesis in a Paired T-Test?

A) There is a significant difference between two paired samples

B) There is no significant difference between two paired samples

C) The data is skewed

D) The two samples are independent

Tes 2 Fill in the blanks

1. A paired t-test is used to compare the _____ of two related groups to determine if there is a statistically significant difference.
2. In a paired t-test, the data must come from _____ observations, meaning each subject or entity is measured twice.
3. The paired t-test assumes that the differences between the paired observations are _____ distributed.
4. The null hypothesis of a paired t-test states that the mean difference between the paired observations is _____.
5. To calculate the t-value in a paired t-test, the formula involves dividing the mean difference by the _____ error of the differences.

6. A paired t-test is commonly used when comparing measurements taken _____ and _____ an intervention.

7. The degrees of freedom (df) for a paired t-test is calculated as the number of paired observations minus _____

8. A paired t-test requires that the differences between pairs are ___ _____ and have no extreme outliers.

9. The test statistic for a paired t-test is compared to a _____ value to determine statistical significance

10. If the p-value is less than the _____ level, the null hypothesis is rejected.

Test 3: Computational Questions 2pts

A fitness coach wants to evaluate the effectiveness of a new training program on improving the speed of a group of 8 athletes. Each athlete's running time (in seconds) is recorded before and after undergoing the program. The data is shown below:

Sample Table:

Athlete	Time Before (seconds)	Time After (seconds)
1	12.5	11.8
2	13.2	12.6
3	11.9	11.4
4	12.8	12.2
5	13.5	12.8
6	12.0	11.5
7	12.6	12.0
8	13.1	12.7

Task:

1. State the null hypothesis (H_0) and the alternative hypothesis (H_a).
2. Compute the mean difference ($\bar{d}$) and standard deviation of differences (s_d).
3. Calculate the test statistic (t) using the paired t-test formula: $t = \frac{\bar{d} - \mu_d}{s_d / \sqrt{n}}$
4. At a significance level of $\alpha = 0.05$, determine whether to reject or fail to reject H_0. Use $t_{\text{critical}} = 1.895$.
5. Write your conclusion about the effectiveness of the training program.