

# Homework 3 Solutions - STAT 252

## Question 12:

**Question 12:** “The interpretation of the test statistic for a paired t-test is the number of standard deviations the difference between the population mean of the two independent groups is from 0” (Hint: there are 4 errors)

## Solution:

1. **Paired t-test applies to dependent (not independent) groups** – The use of “two independent groups” is incorrect. Paired t-tests are used when the two sets of observations are related (e.g., before and after measurements on the same subjects).
2. **It should refer to the *mean of the paired differences*** – The test statistic in a paired t-test is based on the sample mean of the differences between paired observations, not on comparing the means of two groups.
3. **Population mean of paired differences, not population mean of two groups** – The null hypothesis in a paired t-test is about the population mean of the **differences**, not the difference between two separate population means.
4. **The phrase should mention the difference is measured in standard errors, not just “standard deviations”** – The test statistic represents the number of **standard errors** the sample mean difference is from 0, not just standard deviations.

Points: 2

## Rubric

Component	Criteria	Points
<b>Conceptual Error Identification</b>	Identifies at least <b>3 of the 4 errors</b> clearly and correctly (e.g., independence vs. dependence, wrong parameter, wrong distributional basis)	1.0
<b>Correct Reasoning and Terminology</b>	Explains why the errors are wrong using correct <b>terminology and logic</b> for paired t-tests (mean of differences, standard error, dependence)	1.0