Main Steps in Conducting a Hypothesis Test

1. Describe the population parameter under investigation.
2. Determine H_0 and H_a based on the problem description.
3. Select α = P(Type I error) for the test.
4. State the form of the test statistic.
5. Collect data and compute the value of the test statistic.
6. Determine the P-value associated with the test statistic.
7. IMPORTANT: State the conclusion in the context of the problem and reiterate the α-value used.

Test for Zero Slope ($H_0: \beta_1 = 0$)

Based on sample data, we either reject H_0 or fail to reject H_0.

Suppose $H_0: \beta_1 = 0$ is rejected.

Interpretations

1. X is useful for predicting Y (i.e., $\exists$ some relationship between X and Y).
2. A more complex model may be more appropriate and it contains a linear component.

Suppose $H_0: \beta_1 = 0$ is not rejected.

Interpretations

1. X by itself provides little or no information for predicting Y.
2. The true relationship between X and Y is not linear and may involve a quadratic, cubic, or other function of X.

In either case, a straight-line regression model may not adequately describe the relationship between X and Y, and a more complicated model is needed.