

Key Statistical Concepts

1. Population vs. Sample

Population: The entire group of interest.

Sample: A subset of the population used for analysis.

2. Mean, Median, and Mode

Mean: Average value.

Median: Middle value.

Mode: Most frequent value.

3. Standard Deviation and Variance

Variance: Measures spread of data.

Standard Deviation: Square root of variance.

4. Probability

The likelihood of an event, ranging from 0 (impossible) to 1 (certain).

5. Correlation

Indicates the strength and direction of a linear relationship between two variables.

Ranges from -1 to +1.

6. Hypothesis Testing

Null Hypothesis (H_0): No effect or difference.

Alternative Hypothesis (H_1): There is an effect or difference.

7. p-value

The probability of observing the data assuming H_0 is true.

$p < 0.05$ indicates statistical significance.

8. Confidence Interval (CI)

A range where the true population parameter likely lies, often expressed as 95% CI.

9. Types of Data

Quantitative: Discrete (countable), Continuous (measurable).

Qualitative: Nominal (no order), Ordinal (ordered).

10. Types of Errors

Type I Error: False positive.

Type II Error: False negative.