UNIT 1

Statistical Inference:
Significance Tests About Hypothesis

Unit Objectives

- Define Hypothesis Testing
- To differentiate the two types of hypothesis
- To perform the five steps of hypothesis testing
- To perform significance testing about population proportions
- To conduct significance testing about population means with small sample size

Unit Contents

- Steps In Performing A Significance Test
- Significance Tests About Proportion
- Significance Tests About Means

The Objective of Statistics

- The objective of statistics is to collect, analyze, interpret, and present data to make informed decisions and draw meaningful conclusions.
- It involves collecting, analyzing, interpreting, and presenting data to understand patterns, **make decisions, and draw conclusions about populations or phenomena**.
  - **Descriptive:** Summarizes and describes the characteristics of a dataset from within a population.
  - **Inferential:** Makes predictions or inferences about a population based on a sample of data.

Describing Populations

- Populations are described by numerical summaries.
  - Numerical summaries are statistical measures that describe and summarize key aspects of a dataset. They provide insights into the central tendency, dispersion, and shape of the data distribution.
  - Common numerical summaries include:
    - **Measures of Central Tendency** – Mean, Median, Mode
    - **Measures of Position** – Quantiles (Quartile, Decile, Percentile)
    - **Measures of Variation** - Variance, Standard Deviation
    - **Measures of Shape** - Skewness, Kurtosis

Numerical Summaries

- A parameter describes a population.
- A statistic describes a sample.

Variable	Parameter	Statistic
Quantitative or Numerical	• Population mean, **μ** (Mu – lowercase) • Population standard deviation, **σ** (Sigma – lowercase)	• Sample mean $\bar{x}$ (x-bar) • Sample standard deviation s.
Qualitative or Categorical	• Population Proportion, **ρ** (Rho – lowercase)	• Sample proportion, $\hat{p}$ (p-hat)

Making Statistical Inferences

- **Estimation**
  - "What is the value of the population parameter?"
  - Confidence interval for estimating a parameter

- **Significance Testing**
  - "Does the population parameter satisfy a specified condition?"

Significance Tests About Hypothesis

- The main goal of many research studies is to check whether the data support certain statements or predictions. These statements are hypotheses about a population.
- In statistics, a hypothesis is a statement about a population, usually claiming that a population parameter takes a particular numerical value or falls in a certain range of values.

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