

# UNIT 1

## **Statistical Inference: Significance Tests About Hypothesis**



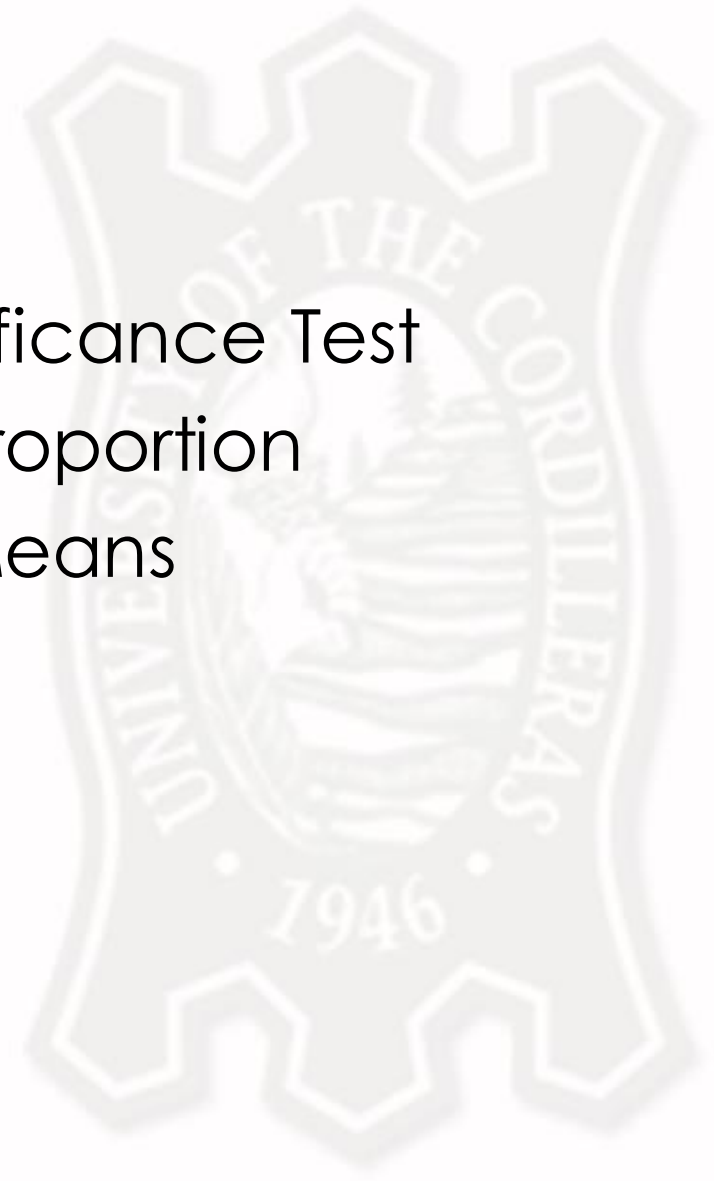
# Unit Objectives

- 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	<ul style="list-style-type: none"><li>• Population mean, <math>\mu</math> (Mu – lowercase)</li><li>• Population standard deviation, <math>\sigma</math> (Sigma – lowercase)</li></ul>	<ul style="list-style-type: none"><li>• Sample mean <math>\bar{x}</math> (x-bar)</li><li>• Sample standard deviation <math>s</math>.</li></ul>
Qualitative or Categorical	<ul style="list-style-type: none"><li>• Population Proportion, <math>\rho</math> (Rho – lowercase)</li></ul>	<ul style="list-style-type: none"><li>• Sample proportion, <math>\hat{p}</math> (p-hat)</li></ul>



# 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.

# END

