

## Basic Terminology:

Small Sample:  $n \leq 30$   
↓  
No. of item selected.

Large Sample:  $n > 30$

#> Mean, Variance etc. <sup>of population</sup> are called parameters  
↓                      ↓  
 $\mu$                        $\sigma^2$

#> Mean & Variance etc. when computed from simple sample are known as statistics. ( $\bar{x}$ ,  $S^2$ )

Thus, a statistics is the estimate of an parameter.

Two Type of estimation

- (1) point estimation                      (2) interval estimation.

## #> Standard error

The standard deviation of the sampling distribution of a statistics is known as standard error.

### (1) Standard error of the mean:

The standard deviation of sample mean estimate of a population mean.

$$SE_{\bar{x}} = \frac{S}{\sqrt{n}}$$

$S \rightarrow$  Sample standard deviation  
 $\sqrt{n} \rightarrow$  Size of the sample

True standard deviation of the sample mean

$$SD_{\bar{x}} = \frac{\sigma}{\sqrt{n}}$$

### (2) Standard error of Proportion:

It is computed from the population of all possible samples of the same size drawn from a population.

$$SE_p = \sqrt{\frac{P(1-P)}{n}}$$

$P \rightarrow$  population proportion  
 $n \rightarrow$  Sample size

## #> Test of Significance:

The methods of inference used to support or reject claims based on sample data are known as test of significance.

## #> Statistical Hypothesis:

A Hypothesis is a preconceived idea about the nature of a population or about the value of its parameters

example: Heights of the CSE students is normally distributed.

## #> Testing of statistical Hypothesis:

It enables us to decide whether the Hypothesis should be accepted or rejected.

[Sample data is not complete, So, results of the test are not final]

The procedure which, on the basis of the sample results, enables us to decide whether a Hypothesis is to be accepted or rejected is called Hypothesis testing.

## #> Step Involved:

- (1) Set Null and Alternative Hypothesis
- (2) Computation of Appropriate Statistical Test.
- (3) Set the level of Significance.
- (4) Establish Critical or Rejection Region
- (5) Decision Rule

### (1) Null Hypothesis:

For applying the test of Significance, we first set up a Hypothesis which is a definite statement about the population parameter called null Hypothesis.

Notation  $\rightarrow H_0$

Null Hypothesis is the Hypothesis which is tested for possible rejection under the assumption that it is true.

### (2) Alternate Hypothesis:

Any Hypothesis which is complementary to the null Hypothesis is called Alternate Hypothesis.

Notation  $\rightarrow H_1$

#> Null Hypothesis is express as

$$H_0: \mu = \mu_0 \rightarrow \text{Assumes mean.}$$

↓  
population mean

#> Alternate Hypothesis is express as

$$H_1: \mu \neq \mu_0 \quad \text{or} \quad H_1: \mu < \mu_0; \quad H_1: \mu > \mu_0$$

## #> Level of Significance:

The level at which one can accept whether an event is statistically significant is known as significance level.

Notation  $\rightarrow \alpha$

A low value of  $\alpha$  means the test is conservative.

## #> Rejection Region (Critical Region)



## #> One Tailed and Two Tailed Test:

A test of a statistical Hypothesis, where the region of rejection is on only one side of the sampling distribution

Region of Rejection is on both side of the sampling distribution.

## #> Error in Sampling:

### (1) Type I Error

It occurs when the researcher reject the a null Hypothesis when it is true.

### (2) Type II Error

It occurs when researcher fails to reject a null Hypothesis when it is false.

| Decision    | Accept $H_0$                             | Reject $H_0$                           |
|-------------|------------------------------------------|----------------------------------------|
| $H_0$ true  | Accept true $H_0$                        | Reject True $H_0$<br>↓<br>Type I Error |
| $H_0$ false | Accept false $H_0$<br>↓<br>Type II Error | Reject false $H_0$                     |