2) Null hypothesis and Alternative

- **Null hypothesis :-**

A null hypothesis is a hypothesis which is to be tested for possible rejection under the assumption that it is true. It is denoted by H_0.

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Example :-

Suppose we think, that the average age of BS student is 16 years written as

$H_0 : \mu = 16$ years

- **Alternative hypothesis :-**

An alternative hypothesis is any hypothesis which is accepted, when the null hypothesis is rejected. It is denoted by H_1

Example :-

If our null hypothesis is $H_0 : \mu = 16$ years, then the alternative hypothesis may be

$H_1 : \mu \neq 16$ years or

$H_1 : \mu > 16$ years

Ch#16 Hypothesis testing

1) Hypothesis testing :- (Procedure)

The process which enables us to decide whether to accept or reject the statement on the basic of sample data collected from population.

2) Statistical hypothesis :- (Def)

A statement which may or may not be true is called statistical hypothesis.

3) Simple hypothesis :-

A hypothesis in which the value of the population parameter is specified is called simple hypothesis.

i.e $\mu = 16$

4) Composite hypothesis :-

A hypothesis in which the value of the population parameter is not specified. is called composite hypothesis. i.e $\mu > 16$ $\mu < 16$

5) Test statistics :-

A test statistic is a function/formula of sample observation that provides a basic

for testing a null hypothesis. The most commonly used test statistic are Z, t and χ^2

6) Acceptence Region :-

Acceplence region is the part of sampling distribution of a statistic which leads to the acceptence of H_0.

7) Rejection / critical Region :-

Critical Region is the part of sampling distribution of a statistic which leads to the rejection of H_0.

8) TYPE one error :- (α) denote.

Probability of reject H_0 when H_0 is true is called type-I error. e.g 1) An innocent person is punished by police 2) A deserving player is not selected in the team.

9) TYPE-II error :-

Probability of accept H_0 when H_0 is false is called type-II error. It is denoted by β.

Example :-

1) A disable person selected for hockey team.
2) A weak student may be passed by the examiner.

10) Power test :-

Reject Ho (null hypothesis) when Ho is false is called power of test.
It is denoted by $1-\beta$

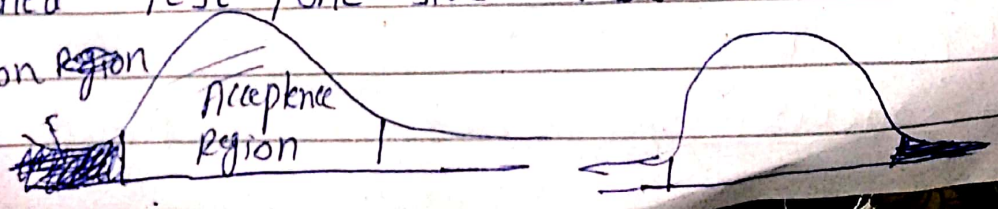
11) Level of significance :-

The probability of making type-I error is called Level of significance.
It is denoted by α
$\alpha = P(\text{Reject } H_o / H_o \text{ is true})$

12) Test statistic :-

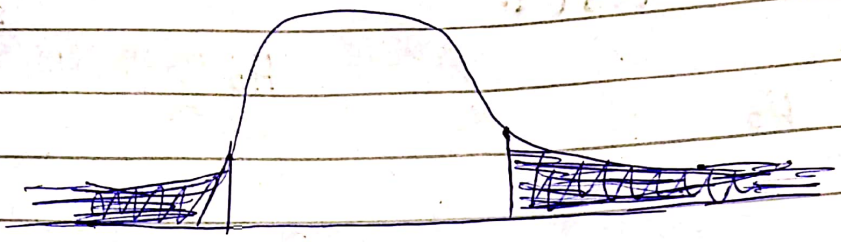
12) one-Tailed test :-

If entire rejection lies either in left or right tail is called one tailed Test / one side test.



13) Two tailed / Two side test :-

If entire rejection lies equally in both tails is called two tailed test.



14) Level of confidence :-

The probability of accepting a true null hypothesis is called Level of confidence.

It is denoted by $1-\alpha$.

15) Procedure for Testing hypothesis :-

i) Ho e.g $\mu = 5.2$

Hi e.g $\mu \neq 5.2$

ii) Level of significance

e.g $\alpha = 5\%$, 0.05

iii) Test statistic :-

e.g $Z = \dfrac{\bar{x} - \mu}{\sigma/\sqrt{n}}$

iv) critical Region :-

v) calculation :-

vi) conclusion :-

{Formulas}

1) t- distribution :-

$$t = \frac{\bar{x} - \mu}{s/\sqrt{n}}$$

2) Z- distribution :-

i) $Z = \frac{\bar{x} - \mu}{\sigma/\sqrt{n}}$ (σ Known)

ii) $Z = \frac{\bar{x} - \mu}{s\sigma/\sqrt{n}}$ (σ unknown)

Condition	Test statistic
1) σ Known (n Small or large)	$Z = \frac{\bar{x} - \mu}{\sigma/\sqrt{n}}$
2) σ unknown ($n \geq 30$)	$Z = \frac{\bar{x} - \mu}{s\sigma/\sqrt{n}}$
3) σ unknown ($n < 30$)	$t = \frac{\bar{x} - \mu}{s/\sqrt{n}}$