Testing of Hypothesis

HYPOTHESIS

Statement or a claim or an assumption about the value of a population parameter

[Ex: Mean, Median, Variance, proportion, etc]

In case of two populations, a hypothesis is Comparative statement or a claim or an assumption about the values of population parameters.

[Ex: Means of two population are Equal, variance of one population is greater than other etc.]

SIMPLE HYPOTHESIS:

If a Hypothesis specifies only one value (OR) Exact value of the population parameter | complete

Ex: $\mu = 60$ Km/liter., $\mu = \mu_0$, $\sigma^2 = \sigma_0$, etc

COMPOSITE HYPOTHESIS:

Hypothesis specifies not just one value but a range of values that the population parameter may assume.

Ex: $\mu > 200$, $\mu_1 > \mu_2$, $\sigma_1^2 \neq \sigma_2^2$ etc

Null Hypothesis: (H_0)

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

[To start with a hypothesis is Made]

ALTERNATIVE HYPOTHESIS (H_1): Any hypothesis which is complementary to the Null hypothesis.

CRITICAL REGION [Regection region]

The SET of all those Samples which Lead to the REJECTION of Null Hypothesis is called critical region. denoted by w.

The set of all those values which lead to the acceptance of Null hypothesis is called Acceptance region. denoted by $\bar{w}$. | NOTE: $w \cup \bar{w} = S$

LEVEL OF SIGNIFICANCE

~~P~~ The probability that a random value of the statistic belongs to the critical region is known as Level of significance

ie. $P[t \in w | H_0] = \alpha$. | $P[t \in \bar{w} | H_1] = \beta$ (or) $1-\alpha$.

The Level of significance usually employed in testing of hypotheses are 5% or 1%.

CRITICAL VALUE(S) (Significant values)

The value of ~~the~~ test statistic which seperates the critical (or Rejection) and the acceptance region is called the critical value (or) Significant value.

It is denoted by Z_α

CRITICAL values (Z_α)	Level of Significance (α) 1%	5%	10%
Two-Tailed Test	$\lvert Z_\alpha \rvert = 2.58$	$\lvert Z_\alpha \rvert = 1.96$	$\lvert Z_\alpha \rvert = 1.645$
Right-tailed Test	$Z_\alpha = 2.33$	$Z_\alpha = 1.645$	$Z_\alpha = 1.28$
Left-tailed Test	$Z_\alpha = -2.33$	$Z_\alpha = -1.645$	$Z_\alpha = -1.28$

Type I & Type II Errors

	Actual Fact	Decision based on sample	Decision
1	H_0 is TRUE	Accept	~~Right~~ Correct
2	H_0 is TRUE	Reject	Wrong I
3	H_0 is NOT TRUE	Accept	Wrong II
4	H_0 is NOT TRUE	Reject	~~Right~~ Correct

I Kind : Rejection of H_0 when it is actually True

II Kind : Acceepectance of H_0 when it is actually wrong.

1. A machine is designed so as to fill bottles with 200 ml. of a medicine. A sample of 100 bottles when measured had a mean content of 201.3 ml. If the standa-rd deviation of the fillings is known to be 5 ml. Test whether the machine is functioning properly. Use 5% level of ~~sing~~ significance.

2. A firm manufactures resistors which are known to have resistance with standard deviation 0.02 ohms. A random sample of 64 resistors had mean resistance 1.39 ohms. Can we conclude that the mean resistance of the resistors manufactured by the firm have mean resistance 1.4 ohms?