**HYPOTHESIS TESTING**

Hypothesis testing is a assumption about a population parameter .The assumption may or may not be true.Hypothesis testing is the formal procedure used by the statisticians to accept or reject the statistical hypothesis.

**Statistical Hypothesis**

The best way to determine whether a hypothesis is true or false would be to examine the whole population,since it is often impractical to examine whole population researchers generally examine sample of the population,id sample of that population does not contain that hypothesis ,the particular hypothesis is rejected

There are 2 types of statistical hypothesis:

1.null hypothesis

2.alternative hypothesis

**Null Hypothesis:**

Null hypothesis is denoted by h0,it is usually that hypothesis in which sample observation purely stand for the chance

**Alternative Hypothesis**

Alternative Hypothesis is denoted by h1,is usually that hypothesis in which random sample of population does not stand for the chance ,get influenced by few factors

**For Example:**

Suppose u want to determine the wheather coin is fair and balanced,so we expect coin flip and show head hence

H0: coin flipped result head

H1: coin flipped result tail

Suppose we flipped the coin 50 times, resulting in 40 Heads and 10 Tails. Given this result, we would be inclined to reject the null hypothesis. We would conclude, based on the evidence, that the coin was probably not fair and balanced.

The Statisticians follow formal procedure to accept or reject the null hypothesis this procedure is called **Hypothesis testing**

* State the hypotheses. This involves stating the null and alternative hypotheses. The hypotheses are stated in such a way that they are mutually exclusive. That is, if one is true, the other must be false.
* Formulate an analysis plan. The analysis plan describes how to use sample data to evaluate the null hypothesis. The evaluation often focuses around a single test statistic.
* Analyze sample data. Find the value of the test statistic (mean score, proportion, t statistic, z-score, etc.) described in the analysis plan.
* Interpret results. Apply the decision rule described in the analysis plan. If the value of the test statistic is unlikely, based on the null hypothesis, reject the null hypothesis.

**Decision Errors**

Two types of errors can result from a hypothesis test.

* **Type I error**. A Type I error occurs when the researcher rejects a null hypothesis when it is true. The probability of committing a Type I error is called the **significance level**. This probability is also called **alpha**, and is often denoted by α.
* **Type II error**. A Type II error occurs when the researcher fails to reject a null hypothesis that is false. The probability of committing a Type II error is called **Beta**, and is often denoted by β. The probability of *not*committing a Type II error is called the **Power** of the test.

**One-Tailed and Two-Tailed Tests**

A test of a statistical hypothesis, where the region of rejection is on only one side of the sampling distribution, is called a **one-tailed test**. For example, suppose the null hypothesis states that the mean is less than or equal to 10. The alternative hypothesis would be that the mean is greater than 10. The region of rejection would consist of a range of numbers located on the right side of sampling distribution; that is, a set of numbers greater than 10.

A test of a statistical hypothesis, where the region of rejection is on both sides of the sampling distribution, is called a **two-tailed test**. For example, suppose the null hypothesis states that the mean is equal to 10. The alternative hypothesis would be that the mean is less than 10 or greater than 10. The region of rejection would consist of a range of numbers located on both sides of sampling distribution; that is, the region of rejection would consist partly of numbers that were less than 10 and partly of numbers that were greater than 10.