SECTION – 1

QUESTION-2.

ANSWER:-

Types of Error:-

In statistical hypothesis testing, a type I error is the incorrect rejection of a true null hypothesis (also known as a "false positive" finding), while a type II error is incorrectly retaining a false null hypothesis (also known as a "false negative" finding).[1] More simply stated, a type I error is to falsely infer the existence of something that is not there, while a type II error is to falsely infer the absence of something that is.

A type I error (or error of the first kind) is the incorrect rejection of a true null hypothesis. Usually a type I error leads one to conclude that a supposed effect or relationship exists when in fact it doesn't. Examples of type I errors include a test that shows a patient to have a disease when in fact the patient does not have the disease, a fire alarm going on indicating a fire when in fact there is no fire, or an experiment indicating that a medical treatment should cure a disease when in fact it does not.

A type II error (or error of the second kind) is the failure to reject a false null hypothesis. Examples of type II errors would be a blood test failing to detect the disease it was designed to detect, in a patient who really has the disease; a fire breaking out and the fire alarm does not ring; or a clinical trial of a medical treatment failing to show that the treatment works when really it does.

When comparing two means, concluding the means were different when in reality they were not different would be a Type I error; concluding the means were not different when in reality they were different would be a Type II error. Various extensions have been suggested as "Type III errors", though none have wide use.

All statistical hypothesis tests have a probability of making type I and type II errors. For example, all blood tests for a disease will falsely detect the disease in some proportion of people who don't have it, and will fail to detect the disease in some proportion of people who do have it. A test's probability of making a type I error is denoted by α. A test's probability of making a type II error is denoted by β. These error rates are traded off against each other: for any given sample set, the effort to reduce one type of error generally results in increasing the other type of error. For a given test, the only way to reduce both error rates is to increase the sample size, and this may not be feasible.

Type I error:-

A type I error occurs when the null hypothesis (H0) is true, but is rejected. It is asserting something that is absent, a false hit. A type I error may be likened to a so-called false positive (a result that indicates that a given condition is present when it actually is not present).

In terms of folk tales, an investigator may see the wolf when there is none ("raising a false alarm"). Where the null hypothesis, H0, is: no wolf.

The type I error rate or significance level is the probability of rejecting the null hypothesis given that it is true.[5][6] It is denoted by the Greek letter α (alpha) and is also called the alpha level. Often, the significance level is set to 0.05 (5%), implying that it is acceptable to have a 5% probability of incorrectly rejecting the null hypothesis.[5]

Type II error:-

A type II error occurs when the null hypothesis is false, but erroneously fails to be rejected. It is failing to assert what is present, a miss. A type II error may be compared with a so-called false negative (where an actual 'hit' was disregarded by the test and seen as a 'miss') in a test checking for a single condition with a definitive result of true or false. A Type II error is committed when we fail to believe a true alternative hypothesis.[

In terms of folk tales, an investigator may fail to see the wolf when it is present ("failing to raise an alarm"). Again, H0: no wolf.

The rate of the type II error is denoted by the Greek letter β (beta) and related to the power of a test (which equals 1−β).