Chi Squared test

It is a way to determine if the category variable is related to the observation or not.

valid to perform when the test statistic is chi-squared distributed under the null hypothesis

$$X^2 = \sum \frac{(\text{observed} - \text{expected})^2}{\text{expected}}$$

If the result > critical value then Reject Null Hypothesis

If the result < critical value then Accept Null Hypothesis

T test

It is a method of comparing two samples to see if there is a difference between them or not

And each sample has their own mean.

But we cannot rely on this mean only to confirm the conclusion because we are dealing with a sample only and not the entire population, and the second reason is that the average varies from one sample to another.

Here is the role of the t test to determine if there is a real difference or just a coincidence

$$t = \frac{\overline{x_1} - \overline{x_2}}{\sqrt{\frac{S_1^2}{N_1} + \frac{S_2^2}{N_2}}}$$

If the result > critical value then Reject Null Hypothesis

If the result < critical value then Accept Null Hypothesis

Z test

It is a method of distinguishing a value from the middle of a different value.

The z score makes a standardization of the measurements through this equation

$$z = \frac{X - \overline{X}}{S}$$

paired test

It is used to compare two sets of scores for one group (before / after), that is, whether there is a statistically significant difference after the experiment.

$$T = \frac{\sum D}{\sqrt{\frac{n \sum D^2 - (\sum D)^2}{n-1}}}$$