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MATRIC:17/mhs07/013

Assignment title:Hypothesis testing

1 What do you understand by hypothesis testing:

A **statistical hypothesis**, sometimes called **confirmatory data analysis**, is a [hypothesis](https://en.m.wikipedia.org/wiki/Hypothesis) that is testable on the basis of [observing](https://en.m.wikipedia.org/wiki/Observable_variable) a process that is [modeled](https://en.m.wikipedia.org/wiki/Statistical_model" \o "Statistical model) via a set of [random variables](https://en.m.wikipedia.org/wiki/Random_variable).[[1]](https://en.m.wikipedia.org/wiki/Statistical_hypothesis_testing#cite_note-1) A **statistical hypothesis test** is a method of [statistical inference](https://en.m.wikipedia.org/wiki/Statistical_inference). Commonly, two statistical data sets are compared, or a data set obtained by sampling is compared against a synthetic data set from an idealized model. An [alternative](https://en.m.wikipedia.org/wiki/Alternative_hypothesis) hypothesis is proposed for the statistical-relationship between the two data-sets, and is compared to an idealized null hypothesis that proposes no relationship between these two data-sets. This comparison is deemed [*statistically significant*](https://en.m.wikipedia.org/wiki/Statistically_significant) if the relationship between the data-sets would be an unlikely realization of the [null hypothesis](https://en.m.wikipedia.org/wiki/Null_hypothesis) according to a threshold probability—the significance level. Hypothesis tests are used when determining what outcomes of a study would lead to a rejection of the null hypothesis for a pre-specified level of significance.

## 2 Difference between classical approach and p value approach in hypothesis testing:

## Classical Approach

The Classical Approach to hypothesis testing is to compare a test statistic and a critical value. It is best used for distributions which give areas and require you to look up the critical value (like the Student's t distribution) rather than distributions which have you look up a test statistic to find an area (like the normal distribution).

The Classical Approach also has three different [decision rules](https://people.richland.edu/james/lecture/m170/ch09-typ.html), depending on whether it is a left tail, right tail, or two tail test.

One problem with the Classical Approach is that if a different level of significance is desired, a different critical value must be read from the table.

## P-Value Approach

The P-Value Approach, short for Probability Value, approaches hypothesis testing from a different manner. Instead of comparing z-scores or t-scores as in the classical approach, you're comparing probabilities, or areas.

The level of significance (alpha) is the area in the critical region. That is, the area in the tails to the right or left of the critical values.

The p-value is the area to the right or left of the test statistic. If it is a two tail test, then look up the probability in one tail and double it.

If the test statistic is in the critical region, then the p-value will be less than the level of significance. It does not matter whether it is a left tail, right tail, or two tail test. This rule always holds.

## **3 IMPORTANCE OF HYPOTHESIS TESTING**

According to the San Jose State University Statistics Department, hypothesis testing is one of the most important concepts in statistics because it is how you decide if something really happened, or if certain treatments have positive effects, or if groups differ from each other or if one variable predicts another. In short, you want to proof if your data is statistically significant and unlikely to have occurred by chance alone. In essence then, a hypothesis test is a test of significance.