**HYPOTHESIS**

Define = in science and research, a hypothesis is the proposed explanation or prediction based on limited evidence, intended as a starting point for further testing

Basically, it is an educational guess that researchers aim to test through experiments or data analysis to see its supported or refused by evidence.

There are 2 types of Hypothesis:

1. null hypothesis (H0): a default position that is no effect or difference
2. alternative hypothesis (H1): a statement suggesting the significant effect or difference, challenging the null hypothesis.

* **HYPOTHESIS TECHNIQUE :**

Intro :

Hypothesis testing is a fundamental concept in statistics, need to make decisions or inferences about the population parameters based on sample data.

It helps us determine whether observed differences or affects in the data are statistically significant or simply due to chance.

Null hypothesis (H0) :

It is statement or assumption about the population parameter that is initially assumed to be true.

It represents status quo or no effect.

Alternative hypothesis (H1 or Ha):

It is a statement that contradicts the null hypothesis and represents the research claim or the effect they are interested in testing.

* Key steps of hypothesis testing:

1. Formulate the hypothesis : define null or alternative
2. Select significance level : choose significance level alpha(α) that represent the threshold for deciding whether the evidence we are using is strong enough to reject the null hypothesis.
3. Collect data : get sample data
4. Calculate test statistics : calculate it from the sample data to which summarize evidence against the null hypothesis

1. Determine p value : calculate the probability of observing the sample result as extreme as or more extreme than the observed results assuming the null hypothesis to be true
2. Make decisions : compare p value to the significance level (α) and apply the decisions rule to determine whether to reject null hypothesis
3. Draw conclusions : based on decision rule draw conclusion regarding null hypothesis and provide interpretation based on results.

T-test:

A t-test is a statistical test used to determine if there is a significant difference between the means of two groups, or between a sample mean and a known population mean. It helps assess whether observed differences are likely due to chance or represent actual differences in the data.

Z-test:

A z-test is a statistical test used to determine whether there is a significant difference between sample and population means, or between the means of two groups, especially when the sample size is large (typically n > 30) and the population variance is known. The z-test relies on the assumption that the data follows a normal distribution.

Difference:

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| --- | --- | --- |
| **Criterion** | **Z-test** | **T-test** |
| Population variance | Known | Unknown |
| Sample size | Large (n>30) | Small (n<30) |
| Distribution | Normal distribution | t-distribution (with df) |
| Test statistics formula |  |  |