Hypothesis Testing:

Concept:

The population mean is unknown. We are making some assumptions about the population mean.

Hypothesis testing is about proving or disproving our assumptions or null hypotheses.

Inferential statistics is used to find some population parameter (mostly population mean) when you have no initial number to start with. So, you start with the sampling activity and find out the sample mean. Then, you estimate the population mean from the sample mean using the confidence interval.

Hypothesis testing is used to **confirm your conclusion** (or hypothesis) about the population parameter (which you know from EDA or your intuition). Through hypothesis testing, you can determine whether there is enough evidence to conclude if the hypothesis about the population parameter is true or not.

H0: Null Hypothesis: Status Quo

H1: Alternate Hypothesis: Challenges the status Quo

Steps for Solving Hypothesis Problem – Critical Value Method

1. Get the population mean
2. Get the population standard deviation
3. Get the sample mean
4. Calculate standard error or sample standard deviation: Pop SD/sqrt(sample size)
5. Get the critical area for one or two tailed test. For e.g. for a two tailed test, with 95% confidence level. The critical percentange for upper bound is 97.5 and lower bound is 2.5

For one tailed test with 97%, the upper cound critical area is 97

1. Calculate the z-score under critical value
2. Calculate the area under critical value with formula Population mean +- zScore at CV \* Standard Error(SD of sample mean)
3. Check whether sample means falls inside outside this critical value.

Steps for Solving Hypothesis Problem – p-Score Method:

Probability that null hypothesis is correct

1. Get the sample mean, population mean
2. Get the population SD and Sample SD(Standard Error)
3. Calculate the z-Score at Sample Mean value which is (sample mean – pop mean)/ Standard Error
4. Calculate the reverse z-Score percentage at this data point(80 or 90 percent)
5. If it’s two-tailed test, multiply reverse after subtracting 1
   1. If it’s two tailed 1 – (z-Score \* 2)
   2. If it’s one tailed test, 1 – (z Score)
6. Check if p-value > acceptance criteria
   1. If p-value is greater than acceptance criteria, we cannot reject null hypothesis
   2. If p-value is lesser then acceptance criteraia , we can reject null hypothesis.

Errors in Hypothesis:

* A type I-error represented by α occurs when you reject a true null hypothesis.
* A type-II error represented by β occurs when you fail to reject a false null hypothesis.
* Increasing the sample size typically reduces the both errors.

