Q3 What is One tail and two tail test?

One Tailed Test:-

A test of statistical hypothesis, where the rejection is on only one side of the sampling distribution, is called a one-tailed test.

for example, suppose the null hypothesis states that the mean is less than or equal to 10. The alternative hypothesis would be that the mean is greater than 10. The region of rejection would consist of a range of numbers located on the right side of sampling distribution, that is, a set of numbers greater than 10.

Two-Tailed Test

A test of a statistical hypothesis where the region of rejection is on both sides of the sampling distribution, is called a two-tailed test.

for example

A test of statistical Hypothesis where the rejection region of rejection is on both sides of sampling distribution is called a two-tailed test.

for example, Suppose the null Hypothesis states the mean is equal to 10. The alternative Hypothesis would be that the mean is less than than 10 or greater than 10.

The region of rejection would consist of a range of numbers located on both sides of sampling distribution; that is, the region of rejection would consist partly of numbers located on both sides of sampling distribution; that is the region of rejection would consist partly of numbers that were less than 10 and partly of numbers ~~the~~ that were greater than 10.

Q. What is critical value and p-value?

Critical value :-

In hypothesis testing testing, a critical value is a point on the test distribution that is compared to the test statistic to determine whether to reject the null hypothesis. If the absolute, value of your test statistic is greater than the critical value, you can declare statistical significance and reject the null hypothesis. Critical value approach to α, so their values become fixed when you choose the test's α.

Specifically the four steps involved in using the critical value approach to conducting any hypothesis test are:-

1. ~~Specifically~~ Specify, the null and alternate hypothesis.

2. Using the sample data and assuming the null hypothesis is true, calculate the value of the test statistic. To conduct the hypothesis test for the population mean μ, we use the t-statistic

$$t^* = \frac{\bar{x} - \mu}{s/\sqrt{n}}$$ which follows

a t-distribution with $n-1$ degrees of freedom.

3. Determine the critical value by finding the value of the known distribution of test statistic such that the probability of making a Type I error - which is denoted by a α (greek letter "alpha") and is called the "significance level of the test," - is small typically (0.01, 0.05, or 0.010)

4. Compare the test statistic to the critical value if the test statistics is more extreme in the direction of the alternative than a critical value, reject the null hypothesis in favor of the alternative hypothesis. If the test statistic is less extreme than the critical value, do not reject the null Hypothesis.

P-value

In statistics, the p-value is the probability of obtaining results at least as extreme as the observed results of a statistical hypothesis test, assuming that the null hypothesis is correct.

The p-value is used as an alternative to rejection points to provide the smallest level of significance at which the null hypothesis would be rejected. A smaller p-value means that there is stronger evidence in favor of the alternative hypothesis.

P-value Table

P-value	Decision
Pvalue > 0.005	The result is not stastically significant and hence don't reject the null hypothesis.
p value < 0.005	The result is stastically significant. Generally, reject the null hypothesis in favour of the alternative hypothesis.
p value < 0.01	The result is highly stastically significant and thus rejects the null hypothesis in favor of the alternative hypothesis.

Step-1

$$z = \frac{\hat{p} - p_0}{\sqrt{\frac{p_0(1-p_0)}{n}}}$$

$\hat{p}$ = Sample proportion

P_0 = assumed population proportion in the null ~~proportion~~ hypothesis

N = Sample size

look at the z-table to find the corresponding value of P from the z-value obtained

Q6. What is Confidence Interval.

→ A confidence interval, in statistics, refers to the probability that a population parameter will fall between a set of values for a certain proportion of times.

→ Confidence interval measure the degree of uncertainty or certainty in a sampling method.

→ They are often constructed using confidence levels of 95% to 99%.

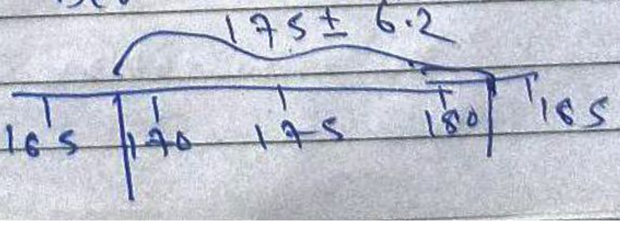
$$C.I. = \bar{x} \pm z\frac{s}{\sqrt{n}}$$

$\bar{x}$ = Sample mean
z = Confidence level value
s = Sample standard deviation.
n = sample size.

Example : Average Height

1. We measure the heights of 40 randomly chosen men, and get a mean height of 175 cm.

Standard Dev = 20 cm



$$\bar{x} \pm z \frac{s}{\sqrt{n}}$$

$$175 \pm 1.960 \times \frac{20^{10}}{2 \times \sqrt{10}}$$

$$175 \pm 6.20 \text{ cm}$$