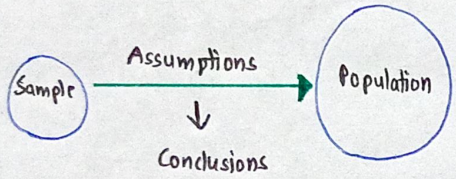
* Hypothesis testing

- It is an act in statistics where we test an assumption regarding a population parameter.
- We test an hypothesis by measuring and examining a random population sample.
- It is done to check plausability of null hypothesis

→ We take sample of a population and make certain assumptions about population based on sample called hypothesis and then try to conclude about the hypothesis.



- Conclusion can be that Null hypothesis accepted or we failed to reject Null hypothesis within Confidence Interval.
- Conclusion can also be that Alternate hypothesis accepted or Null hypothesis rejected within Confidence Interval.

⊙ Test stastic (T) is dependent on test and is basically calculated value of critical value (c).

⊙ Null hypothesis is stastical theory that suggests their is no statistical significane exists between the sample and population.
It is basically the default assumption which is made about population based on facts.

⊙ Alternate hypothesis is stastical theory that suggests their is statistical significance between the sample and population.
Basically its just opposite of what we assumed in null hypothesis.

→ Null hypothesis represented by H_0 and alternate hypothesis by H_1 or H_a.

⊙ Level of significance (α) is fixed probability of rejecting a True Null Hypothesis.

$$\alpha = 1 - CI$$

ex- if $\alpha = 5\%$ that means we are okay to take 5% risk and conclude their exists a difference when their is no actual difference.

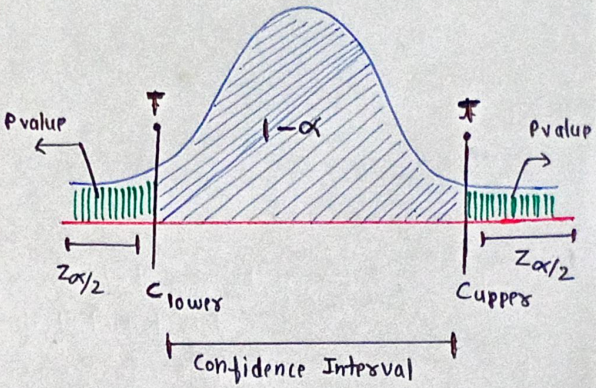
⊙ Critical value (C) is the value in distribution beyond which Null hypothesis is rejected.

⊙ Confidence Interval (CI) is the range of value in which Null hypothesis is accepted.
Critical value is the end point of CI.

⊙ P-value is proportion of samples that would be at extreme end of distribution and null hypothesis is rejected here.

P value is the region with minimum significance level.

ex- Consider Normal Distribution. with $\alpha = 5\% = 0.05$, $CI = 95\% = 0.95$



→ Procedure for testing

A Define Null and Alternate Hypothesis.
B Set α and CI.
C Compute test statistics (choose which suits data)
D Conclude:

- if $T \geq C_{upper}$ and $T < C_{lower}$, reject the hypothesis.
- if $T \geq C_{lower}$ and $T \leq C_{upper}$, fail to reject null hypothesis.

or

- if p value $> \alpha$, fail to reject null hypothesis.
- if p value $\leq \alpha$, reject null hypothesis.