Hypothesis Testing :-

we are making a statement that

$\mu_{height} = [\bar{\mu}_x \pm Z_{score} \frac{\sigma}{\sqrt{n}}]$ with Y% Confidence

To prove this statement whether its Correct (or) not ; we use Hypothesis testing.

Null Hypothesis :→ H_0

Alternative Hypothesis :→ H_1

Notes:-

always H_0 and H_1 are opposite

Ex:- ~~Ho~~ $H_0 \rightarrow$ person is innocent
~~Ho → A.p.~~

$H_1 \rightarrow$? ... and Conclusion

Sol:- $H_1 \rightarrow$ person is not innocent
(opposite of H_0).

after doing some steps we conclude

case(i)
→ I reject the H_0
Conclusion
i.e accepting Alternative ~~null~~ hypothesis (H_1)

case(ii)
→ Fail to reject the H_0
i.e accepting H_0

Note:-
we never say accept H_0, (or) H_1;

we will say reject H_0 (or) Fail to reject H_0. Everything depends H_0.

Ex:- A pista house makes a biryani packet of size of 500 gms. A person claims biryani packet won't be 500 gms

Sol:-

Basically

$H_0 \longrightarrow$ (status Quo) (or) (Ground truth)

$H_1 \Longrightarrow$ Bold claim

Here,

$H_0 \Rightarrow$ (status Quo) $\Rightarrow \mu_{weight} = 500$

$H_1 \Rightarrow$ (Bold claim) $\Rightarrow \mu_{weight} \neq 500$

Note:-

$H_0 :\Rightarrow =, \leq, \geq$

$H_1 \Rightarrow \neq, >, <$

only these symbols are allowed for ~~respect~~ corresponding H_0 & H_1.

Hypothesis testing:

(1) Given, a man claims that he has ~~bas~~ points atleast 1500. (getting 1500 is very hard)

<u>Sol</u>

Step 1:-

H_0:- $\mu \leq 1500$

H_1:- $\mu > 1500$

Step 2:- calculate sample mean

Take a sample $n=5$,

(suppose 1400, 1600, 1510, 1490, 1500)

$\bar{X} = 1500$

Step 3:-

Calculate z-score (or) t-score.

σ is given $\Rightarrow$ z-score $= \dfrac{\text{obs} - \text{mean}}{\text{std}} = \dfrac{\bar{X} - \mu_{\bar{x}}}{\sigma/\sqrt{n}}$

σ is not given $\Rightarrow$ t-score $= \dfrac{\text{obs} - \text{mean}}{\text{std}} = \dfrac{\bar{X} - \mu_{\bar{x}}}{S/\sqrt{n}}$

S → Sample S.D

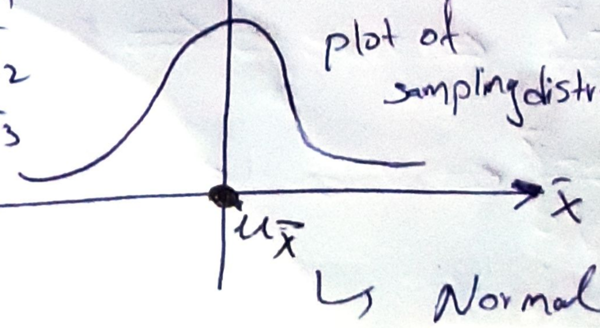
□ $\bar{x}_1$

□ $\bar{x}_2$

□ $\bar{x}_3$

⋮

□ $\bar{x}_n$



plot of sampling distribution

↳ Normal distribution

Step 4:- Decide α

Suppose 90% confidence level

$\hookrightarrow$ 10% α

$1 - \alpha = 0.90$

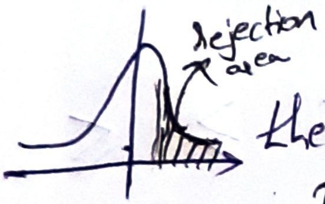
$\Rightarrow \boxed{\alpha = 0.10}$

Note:- If α is very less. then more and more proof to reject H_0.
↳ In medical, α is very less & confidence level is very high

Note:-

Case (i) suppose $H_0 \rightarrow \mu \leq 300$

$H_1 \rightarrow \mu > 300$

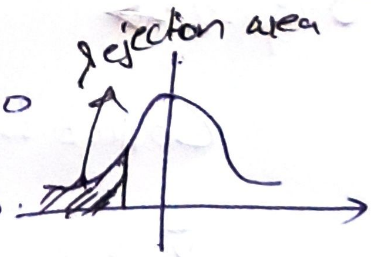


then I have to perform Right tail test (as $>$ in H_1)

Case (ii) suppose

H_0 :- $\mu \geq 300$

H_1 :- $\mu < 300$



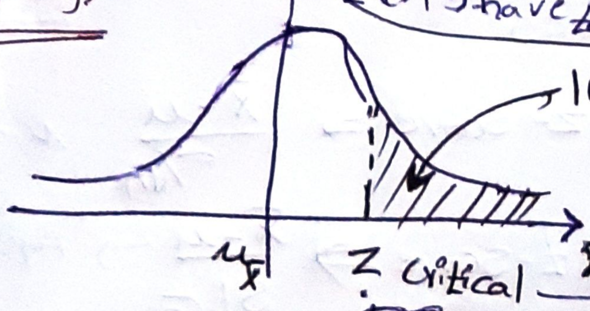
then I have to perform Left tail test (as $<$ in H_1)

Case (iii) suppose $H_0 = 300$ If $\alpha = 0.5$

$H_1 \neq 300$

then I have to perform two tail test (as $\neq$ in H_1)

Step-5:-

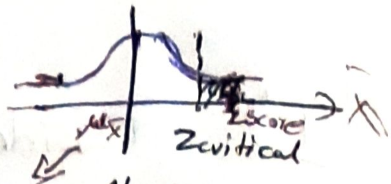


10% rejection area. (10% data lies here)

Z critical → boundary for 10% data

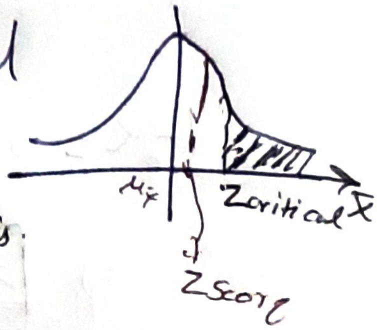
Z-score → which was calculated in step-3.

if z-Score > z critical



~~print(~~ reject null hypothesis

Else:- zscore < z critical



Fail to reject null hypothesis.

Null hypothesis:- Steps

Step-1:→

$H_0 \to$ (Null) $\longrightarrow$ $=$ $\geq$ $\leq$

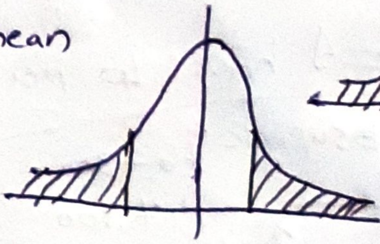
$H_1 \to$ (Alternative) → (bold claim) → $\neq$ $<$ $>$

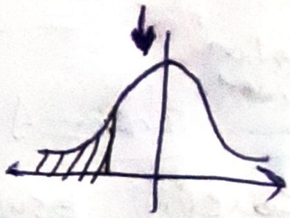
two tail test | Left tail test | Right tail test

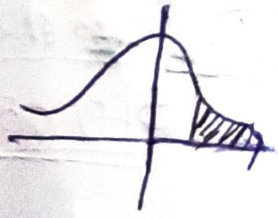
Step-2:→

Collect the Sample

$\bar{X} \leftarrow$ Samplemean







Step 3:→

Test Statistics

σ is given $\Rightarrow$ z-score $\Rightarrow \dfrac{\bar{x}-\mu}{\sigma/\sqrt{n}}$ $\mu, \sigma \to$ populaton

σ is not given $\Rightarrow$ t-score $\Rightarrow \dfrac{\bar{x}-\mu}{S/\sqrt{n}}$ → population mean

~~Population~~ Sample S.D

Step 4: Define the Significance level α

ex: 90% Confidence

$\Rightarrow \alpha = 1 - 0.9 = \underline{\underline{0.10}}$

$H_1 \Rightarrow \neq$ $>$ $<$