Two tailed test :-

* A statistical hypothesis in which the alternate hypothesis has 2 ends.

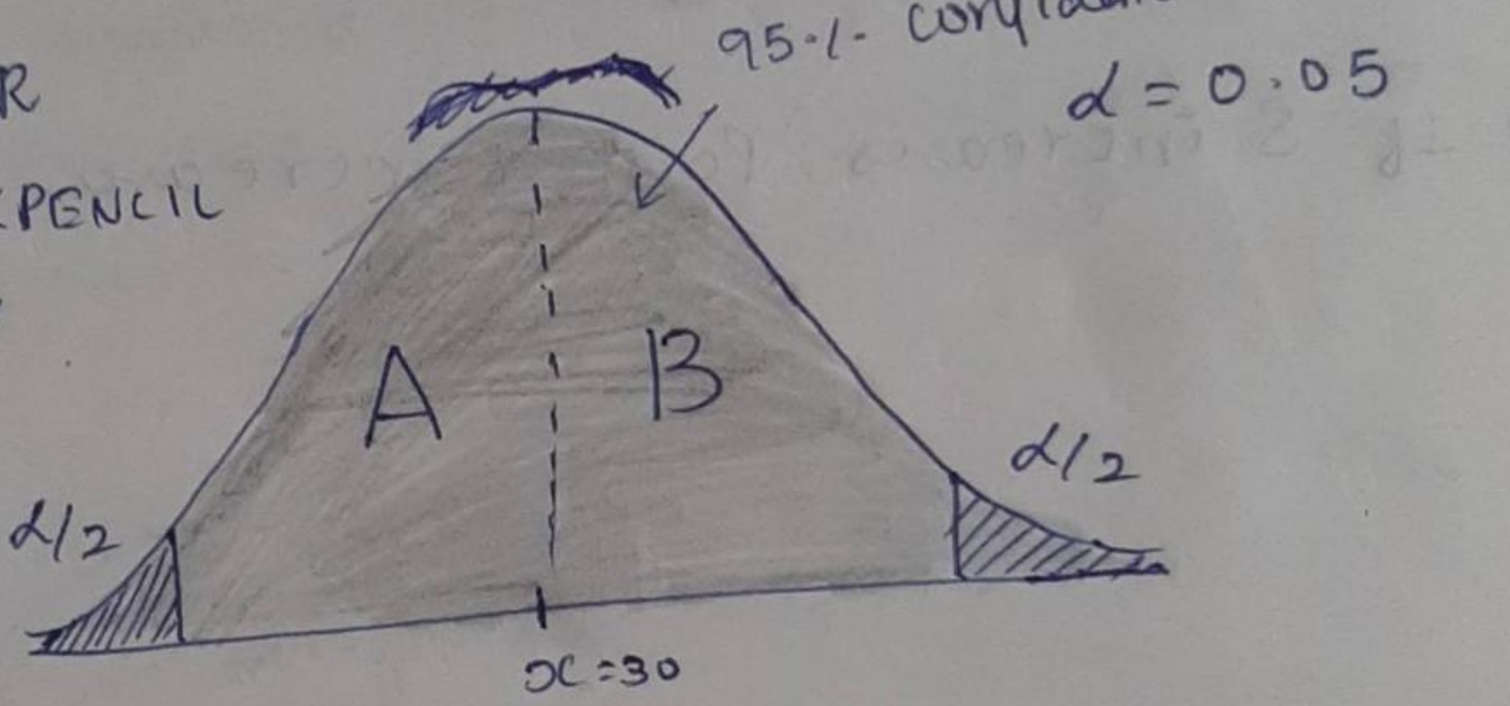
For example

$H_1 : x \neq 30$

* So in this case the x may be less than 30 or greater than 30.

* So this hypothesis has 2 ends :-

* CONSIDER THE DARKPENCIL SHADE *



* So the x can be in A part or in B part. A and B are symmetric.

One tailed test :-

* A statistical hypothesis in which the alternate hypothesis has 1 end.

* It can be either left tailed or Right tailed.

Left tailed :-

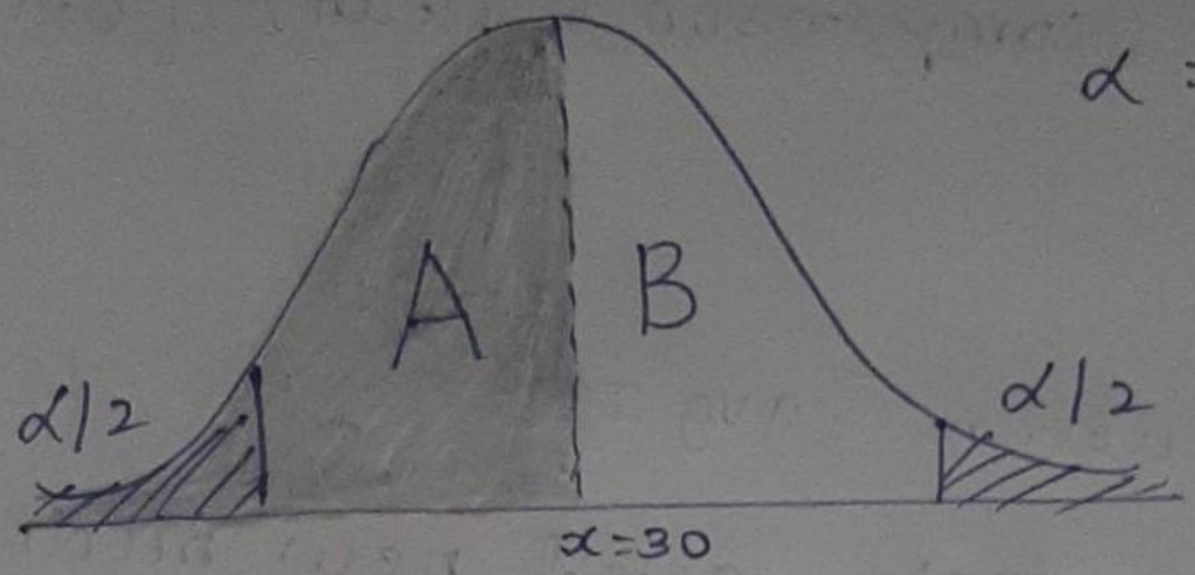
For example

$H_1 : x < 30$

So in this case, the experiment we want to test has one end.

95% confidence

$\alpha = 0.05$



So here we will consider only A part and we will ignore B part, since it is out of context (H_1)

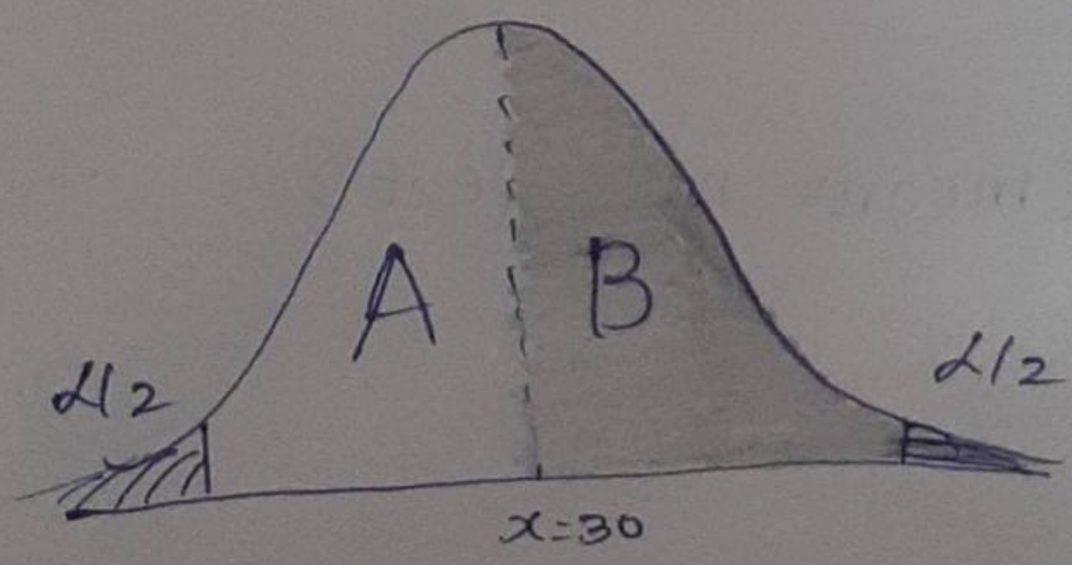
Right tailed :-

For example

$H_1 : x > 30$

95% confidence

$\alpha = 0.05$



Here will consider B part and ignore A because its out of context (H_1)

* Basic idea of hypothesis testing is to perform different tests on sample and draw a conclusion about the Population.

1 - 0.05

Z-test :- (comparison of Mean) [one sample]

* To be used when sample size $n >= 30$ and Population std devation should be known.

Problem :- In a population, avg IQ $\mu = 100$, with $\sigma = 15$ then doctor tested new medication whether it increases or decreases the IQ. After 1 month sample of 30 participant were taken, and this 30 people has IQ mean of $\bar{x} = 30$.

Did medication affect intelligence?

$\alpha = 0.05$

(1) $H_0 : \mu = 100$ (means no effect)

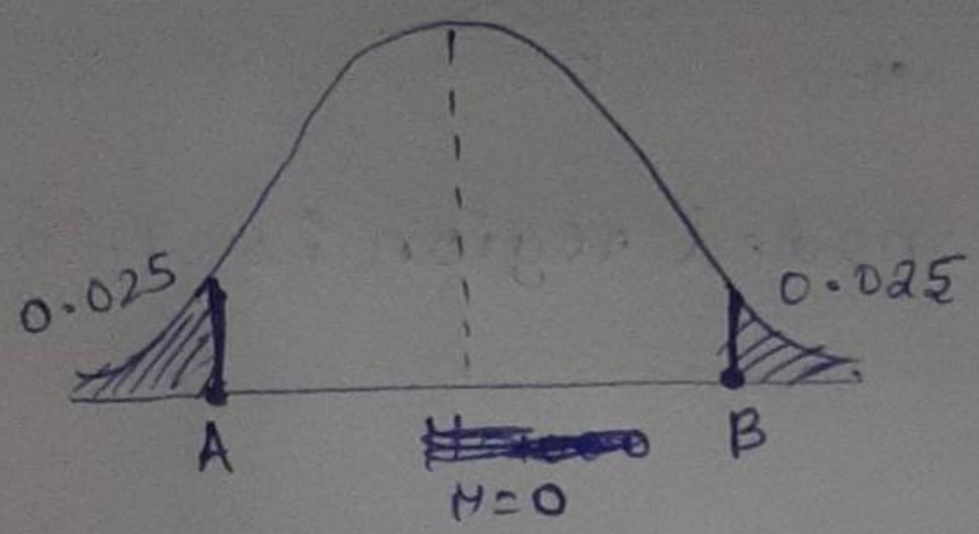
$H_1 : \mu \neq 100$

② $\alpha = 0.05$

③ Stating decision rule (~~just explaining~~)

i) ~~Convert data~~ Here will use standard normal distribution.

EXPLANATION



Here $M = 0$ because $Z = \frac{x_i - M}{\sigma} = \frac{100 - 100}{\sigma} = 0$

ii) Here i want to find A and B value, means not a actual value Z score of A and B.

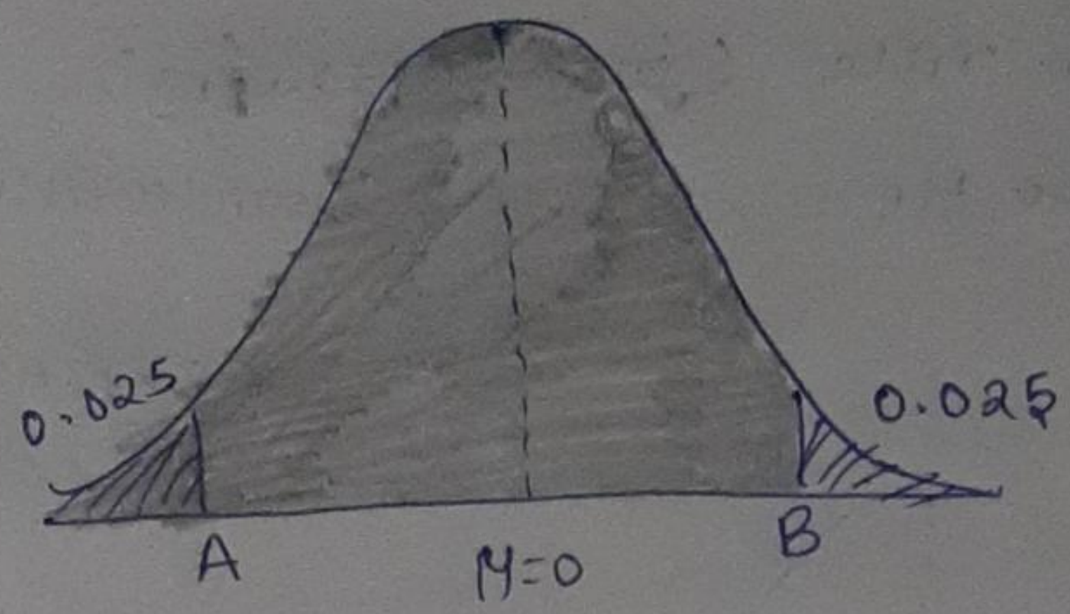
iii) Here $\alpha = 0.05$ which is given, it is divided as 0.025 in either sides.

iv) Lets take ~~use~~ area of the full curve = 1.

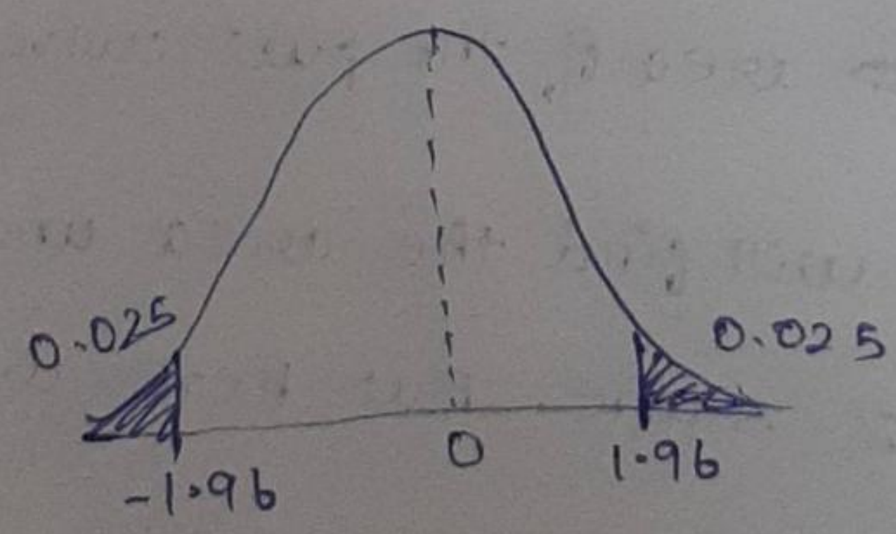
v) Usually we will find the area under the curve using Z-score. But here will find Z-score using area under curve.

vi) So Lets find

$1 - 0.025 = 0.9750$



* The area of shaded region is 1-0.025 that is 0.975
* So If I find the Z score for 0.975, that Z score will be the value of B.
* using Z table i found the value is 1.96.
* Since the distribution is symmetric the value of A = -1.96



* So now i found the confidence range that is -1.96 to 1.96.
* So now perform ~~test~~ test statistic.

(2) Test statistic

$$Z = \frac{\bar{x} - M}{\frac{\sigma}{\sqrt{n}}}$$

$\bar{x} = 140$ $n = 30$

$M = 100$

$\sigma = 15$

$$= \frac{140 - 100}{\frac{15}{\sqrt{30}}}$$

$Z = 14.60$

this

∴ If ~~this~~ Z lies between -1.96 to 1.96 accept the null hypothesis else reject null hypothesis

∴ Here it does not lies between the range

So, reject the null hypothesis

∴ Accept the H,

~~∴ There is a~~

Result:-

There is a change in IQ //

One sample Z test with proportion :-

A Survey claims that 9 out of 10 doctor recommend aspirin for their patients with headache. To test this claim, a random sample of 100 doctors is taken. Out of these 100 doctors, 82 indicate that they recommend aspirine. Is this claim accurate? ($\alpha = 0.05$)

Ans :-

(1)

$H_0 : P = 0.90$ $\quad 9/10 = 0.90$

$H_1 : P \neq 0.90$

(2) $\alpha = 0.05$

(3) decision rule $\Rightarrow$ -1.96 to 1.96

(4) test statistic

$$Z_0 = \frac{\hat{P} - P_0}{\sqrt{\frac{P_0(1-P_0)}{n}}}$$

$\hat{P} \rightarrow$ Prob with respect to sample

$\hat{P} \Rightarrow \frac{82}{100} = 0.82$

$P_0 \rightarrow$ Prob with respect to population (survey)

$P_0 = \frac{9}{10} = 0.90$

$n \longrightarrow$ sample size

$n = 100$

$$Z_0 = \frac{0.82 - 0.90}{\sqrt{\frac{0.90(0.10)}{100}}}$$

$$\boxed{Z_0 = -2.667}$$

$\therefore$ Its not in range of -1.96 to 1.96

So reject null hypothesis.

$\therefore$ Accept H_1

Result:

The claim is inaccurate //