Eg. In a population the Avg I.Q. $\mu = 100$ with $\sigma = 15$ than the doctor tested a new medication to find out whether it increase or decrese.

After one month sample of 30 participant where taken and 30 participant had $\bar{x}$ is 140.

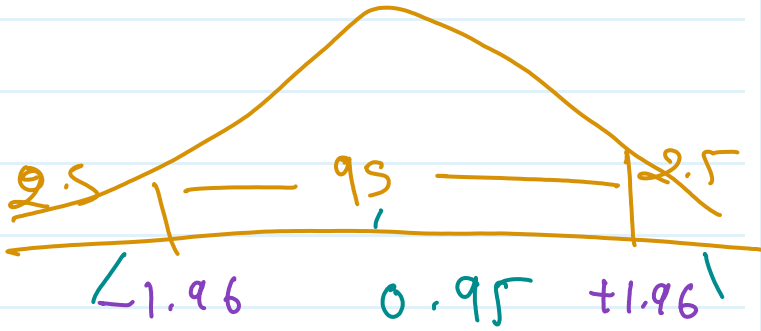
Did this medication effect intelligence given is significant value $\alpha = 0.05$

Soln

$H_0 = \mu = 100$

$H_1 \neq \mu = 100$

$\alpha = 0.05$



95

$= 5/2 = 2.5$

$= 0.025$

Z-test

$1 - 0.025 = 0.975$

$= 0.975$

Z-table

+1.96 to − 1.96

< -1.96
> 1.96
} $- H_1$

Z-test

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

$$= \frac{140 - 100}{15/\sqrt{30}} \Rightarrow 14.65$$

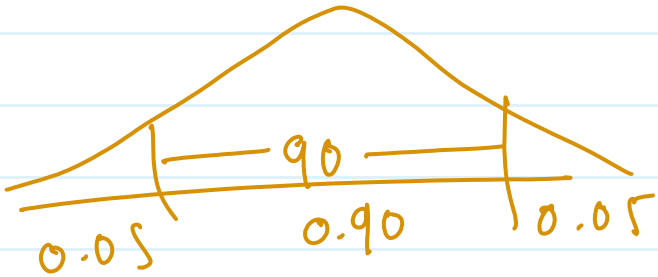
If value is greater than +1.96 than we can say

Reject null hypothesis $- H_0$
Accept Alternet hypothesis $- H_1$

Eg:- $\alpha = 0.1$

$0.1/2 = 0.05$

$1 - 0.1 = 0.90$



Z-table

$+1.65 \neq 0 \quad -1.65$

$|4.65|$

H_0 Reject

H_1 Accept

Eg:- for T-test

$\mu = 100$ I.Q.

$n = 25$

$\bar{X} = 110$

$S = 20$

$\alpha = 0.05/2$

$= 0.025$

$1 - 0.025 = 0.975$

T-table – 0.975

+2.064 to -2.064

> >

T-test $= \frac{\bar{X} - \mu}{s/\sqrt{n}}$

$\Rightarrow \frac{110 - 100}{20/\sqrt{25}}$

$\Rightarrow \frac{10}{4} \Rightarrow 2.5$ (1.97)

H_0 Reject

H_1 Accept

We fail to reject null hypothesis

eg. A survey claim that 9/10 doctor recommendate aspirin for with headach to test this claim a random sample of 100 doctor is taken out of this 100 doctor 82 indicate that they recco. aspirin. It this claim accurate. $\alpha = 0.05$

Soln

$$H_0 = 0.9$$

$$H_1 \neq 0.9$$

$$\alpha = 0.05$$

Z-statistic

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

$$\hat{P} = 82/100 = 0.82$$

$$P_0 = 0.90$$

$$Z_0 = \frac{0.82 - 0.90}{\sqrt{\frac{0.90(1-0.90)}{100}}}$$

$$\Rightarrow \boxed{-2.667}$$

$\alpha = 0.05$ $\qquad 0.05/2 = 0.025$

$Z- = 0.975$

$1 - 0.025 = 0.975$

Z-table

$-2.667 \leftarrow -1.96$ to $+1.96$

Reject null hypothesis

Accept Alternet hypothesis.

$\Rightarrow \quad 7/10$

$\Rightarrow \quad \alpha = 0.05$ $\qquad 82/100$

$\hat{p} = 0.82$

$$\Rightarrow \quad \frac{0.82 - 0.70}{\sqrt{\frac{0.70\,(1-0.70)}{100}}}$$

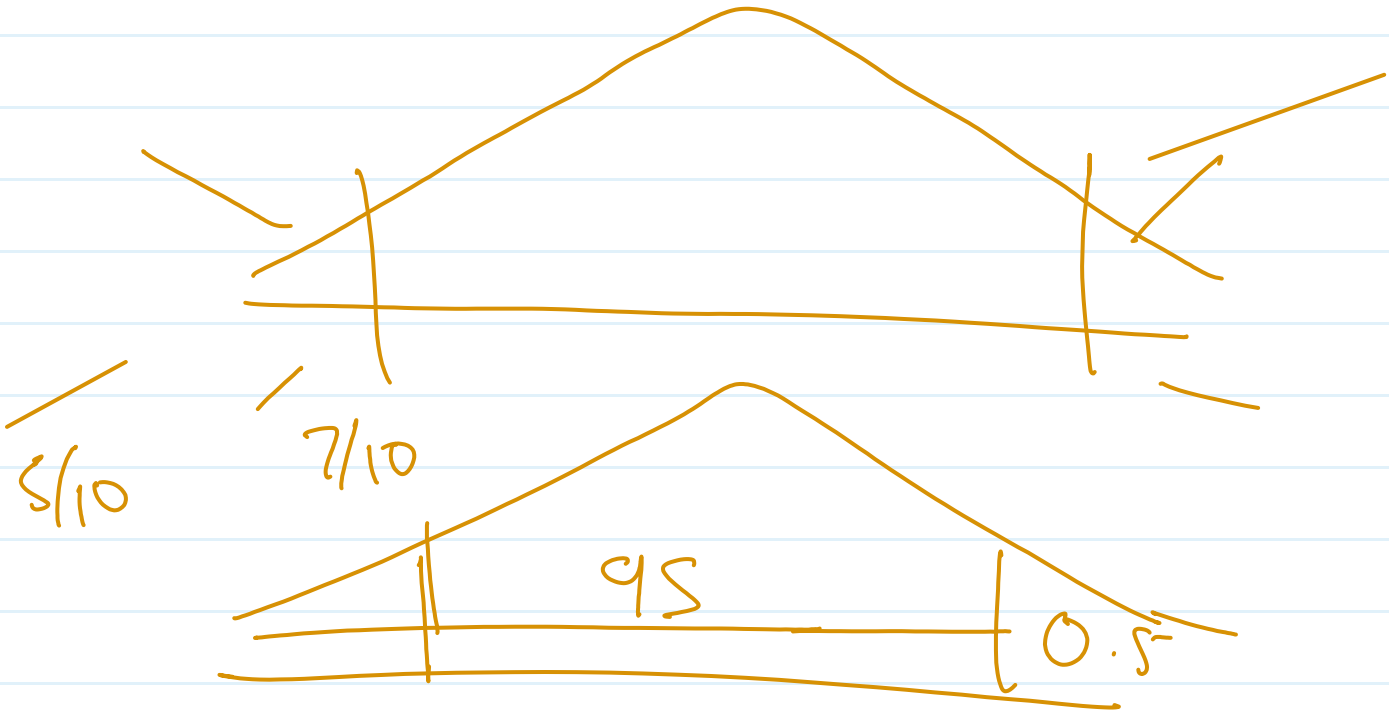
$$\Rightarrow \quad \frac{0.12}{0.046} \quad \Rightarrow 2.61$$

$-1.96 \quad$ to $\quad +1.96$

$\alpha = 0.05/2 \rightarrow$ Two Tail test

$\alpha = 0.05$

$1 - 0.05 = 0.95$ — Z-table


5/10
7/10
95
0.5