

Q2) In a quant test of the CAT exam, the population standard deviation is known to be 100. A sample of 25 tests taken has a mean of 520 construct an 80% CI about the mean

Ans:-

step 1:-  $n = 25$

mean  $\mu = 520$  or  $\bar{x} = 520$

standard deviation  $\sigma = 100$  or  $s = 100$

C.I = 80%,  $\alpha = 1 - C.I = 0.2$

step 2:- for confidence interval 80% the z value is 1.282

step 3:- z value in the formula of C.I

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

$$520 \pm 1.282 \frac{100}{\sqrt{25}}$$

$520 \pm 25.640m$ , 25.64 is called margin of error

$$\Rightarrow 545.640m \quad 494.360m$$

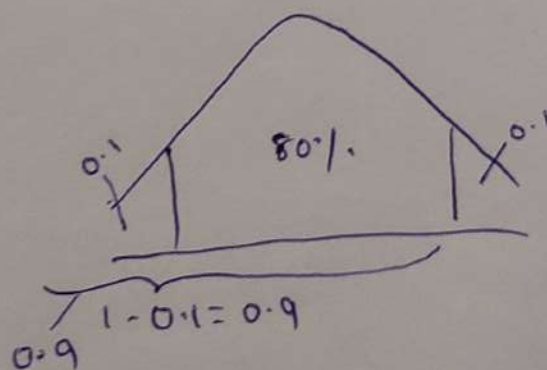
C.I = point estimate  $\pm$  margin error,  $\alpha = 0.2$

$$= \bar{x} \pm z_{\alpha/2} \frac{\sigma}{\sqrt{n}}$$

$$= 520 \pm z_{0.2/2} \frac{100}{\sqrt{25}}$$

$$= 520 \pm z_{0.1} \frac{100}{\sqrt{25}}$$

$$= 520 \pm 25.640m$$



④

\* What is the value of the 99 percentile?

2, 2, 3, 4, 5, 5, 5, 6, 7, 8, 8, 8, 8, 8, 9, 9, 10, 11, 11, 12

Ans:- Given

2, 2, 3, 4, 5, 5, 5, 6, 7, 8, 8, 8, 8, 8, 9, 9, 10, 11, 11, 12

$n = 20$

$$99 \text{ Percentile} = \frac{\text{Percentile}}{100} \times (n+1)$$

$$= \frac{99}{100} \times (20+1)$$

$$= \frac{99}{100} \times 21$$

$$= 20.79$$

The value of 99 percentile is 20.79



③ A car company believes that the percentage of residents in city ABC that owns a vehicle is 60% or less. A sales manager disagrees with this. He conducts a hypothesis testing surveying 250 residents and found that 170 responded Yes to owning a vehicle

a) state the null & Alternate hypothesis

b) At 10% significance level is there enough evidence to support the idea that vehicle ownership in city ABC is 60% or less?

Ans:- Given  $H_0 : P \leq 0.60 \rightarrow$  null Hypothesis

$H_a : P > 0.60 \rightarrow$  alternate hypothesis

$$n = 250, \bar{x} = 170$$

$$\hat{p} = \frac{\bar{x}}{n} = \frac{170}{250} = 0.68 \Rightarrow \hat{p} = 0.68$$

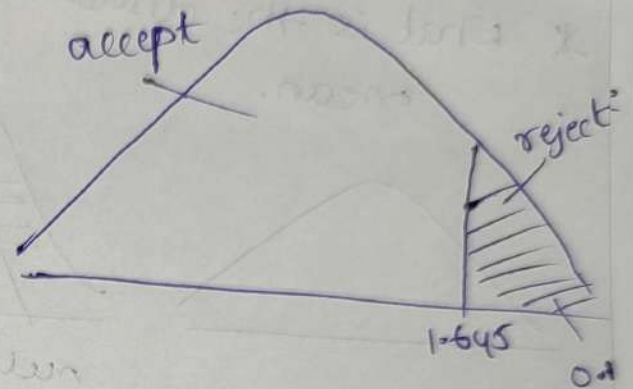
$$P_0 = 0.60, q_0 = 1 - 0.60 \Rightarrow 0.40$$

Significance level  $\alpha = 10\% \Rightarrow 0.10$ , Confidence level  $= 1 - 0.10 \Rightarrow 0.90$

$\Rightarrow$  Decision boundary

accept

$$z = \frac{\hat{p} - p_0}{\sqrt{\frac{p_0 q_0}{n}}} = \frac{0.68 - 0.60}{\sqrt{\frac{0.60(0.40)}{250}}} = \frac{0.08}{0.030984} = 2.58$$

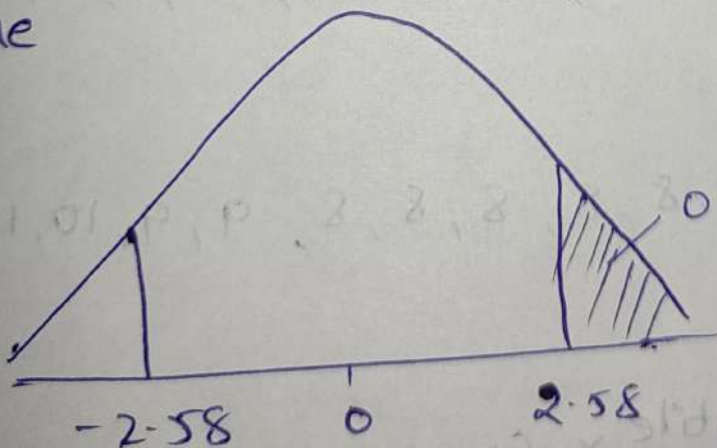


$1.645 \leq 2.58$  reject hypothesis

At 10% significance there is enough evidence to reject the idea that the vehicle ownership city ABC is 60%.

$$p\text{-value} = P(Z \geq 2.58)$$

p-value



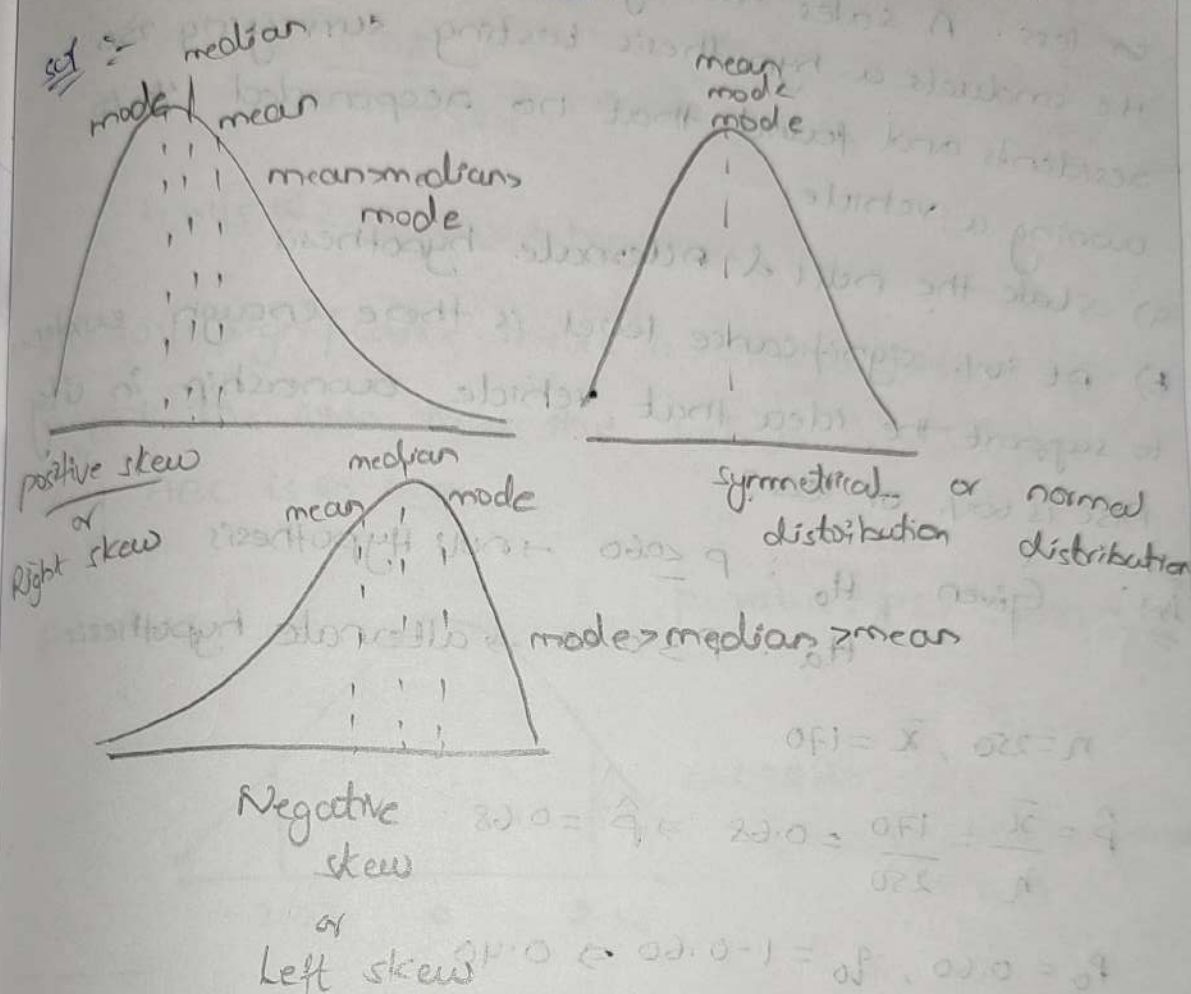
0.099506

$$p\text{value} = 0.099506 + 0.099506 = 0.19$$

Decision boundary



Q3 Assignment ③ :- What is difference between mean, median, mode of right skewed and left skewed distribution



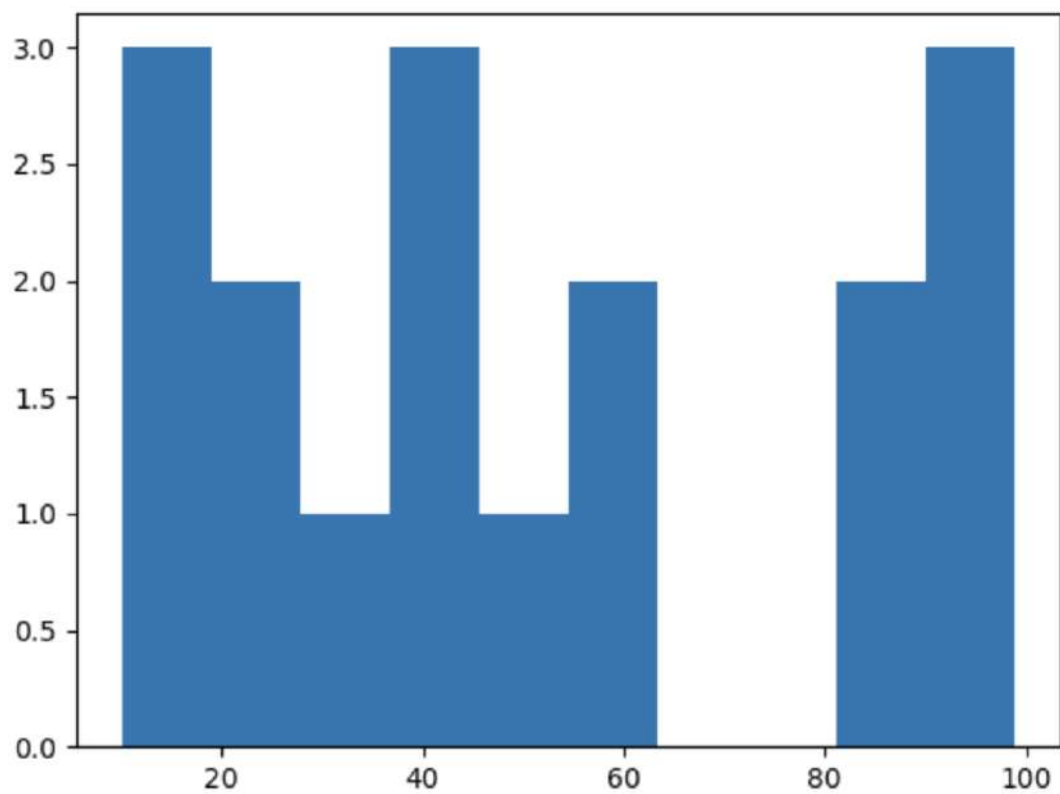
Examples of Right skew  $\rightarrow$  Wealthy distribution, length of comments

Examples of normal  $\rightarrow$  Age, weight, height, etc distribution

examples of left skew  $\rightarrow$  Life span of human being  
 $\rightarrow$  Difference between mean, mode, median of right and left skewed is

for right skew  $\rightarrow \text{Mean} > \text{median} > \text{mode}$   
 left skew  $\rightarrow \text{mode} > \text{median} > \text{mean}$

```
[1]: import matplotlib.pyplot as plt  
  
x=[10, 13, 18, 22, 27, 32, 38, 40, 45, 51, 56, 57, 88, 90, 92, 94, 99]  
plt.hist(x, bins=10)  
plt.show()
```



## Assignment - 10

draw a histogram for following data

eg:- 10, 13, 18, 22, 27, 32, 38, 40, 45, 51, 56, 57, 88, 90, 92, 94, 99

bins = 5 & bin size = 20

### Histogram

