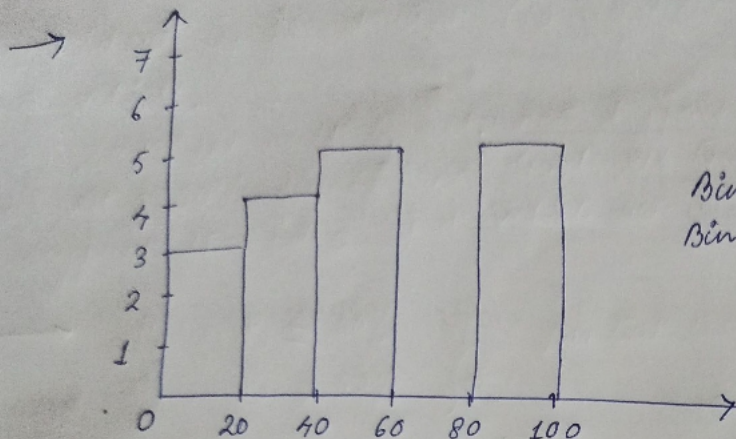


## Statistics assignment

Q1. Plot a histogram

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



Q2. In a quant test of CAT Exam, pop<sup>l</sup> std dev = 100. A sample of 25 tests taken has a mean of 520. Construct 80% CI about the mean.

$\rightarrow$  Here, given, Pop. std. dev ( $\sigma$ ) = 100  
Sample ( $n$ ) = 25  
Mean ( $\bar{x}$ ) = 520  
Confidence interval (CI) = 80%.

$$\alpha = 1 - CI = \text{Significance value}$$
$$\Rightarrow 1 - 0.80 = 0.20$$

$$\therefore \alpha = 0.20$$

$$\text{Now, } Z_{\alpha/2} = Z_{0.20/2} = Z_{0.10}$$

$$Z_{0.10} = 1 - 0.10 = 0.90$$

$$\therefore Z_{0.10} = 1.29$$



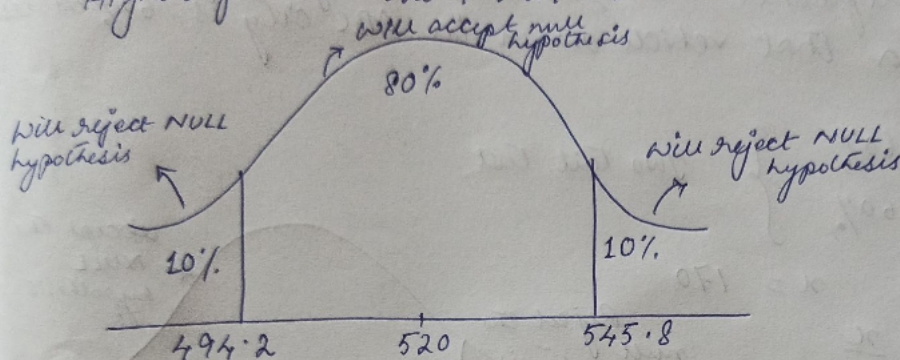
$$\text{Lower fence} \Rightarrow \bar{n} - z_{\alpha/2} \left( \frac{\sigma}{\sqrt{n}} \right)$$

$$= 520 - 1.29 \frac{100}{5}$$

$$= 520 - 25.8$$

$$= 494.2$$

$$\text{Higher fence} = 520 + 1.29 \times 20 = 545.8$$



If CI is 494.2 to 545.8, then will accept NULL hypothesis  
 If data point is lesser than 494.2 or higher than 545.8, then it will reject NULL hypothesis.

3. What is the value of 99 percentile?

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

$$\rightarrow \text{Reqd. value} = \frac{\text{Percentile}}{100} \times (n+1)$$

$$= \frac{99}{100} \times (20+1) = \frac{99 \times 21}{100} = 20.79$$

(index position)

value = 12.



Q4. A car believes that the percentage of citizens in city ABC that owns a vehicle is 60% or less. A sales manager disagrees. He conducts a hypothesis testing surveying 250 residents & found that 170 residents responded yes to owning a vehicle.

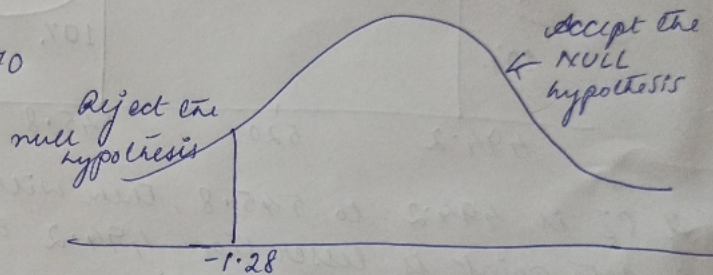
- a) State the null & alternate hypothesis  
 b) At a 10% significance level, is there enough evidence to support the idea that vehicle owner in ABC city is 60% or less

$$\rightarrow \left. \begin{array}{l} H_0 : P_0 \leq 60\% \\ H_1 : P_0 > 60\% \end{array} \right\} \text{Two tail test}$$

also,  $n = 250$ ,  $x = 170$

Proportion  $\hat{P} = \frac{x}{n}$

$$\Rightarrow \hat{P} = \frac{170}{250} = 0.68$$



$$q_0 = 1 - P_0 = 1 - 0.60 = 0.40$$

$$\alpha = 0.10, \text{ C.I.} = 90\%$$

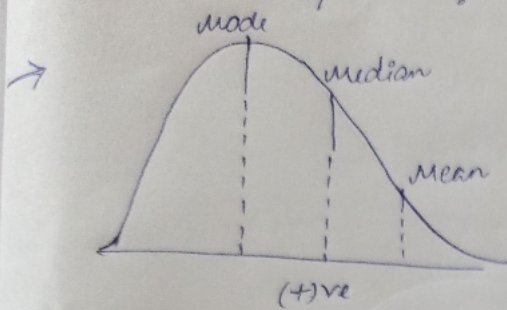
$$Z_{0.10} = -1.28$$

$$Z\text{-Test} = \frac{\hat{P} - P_0}{\sqrt{\frac{P_0 q_0}{n}}} = \frac{0.68 - 0.60}{\sqrt{\frac{0.60 \times 0.40}{250}}} = \frac{0.08}{\sqrt{\frac{0.24}{250}}} = 2.588$$

$2.588 > -1.28$ , we accept the null hypothesis.



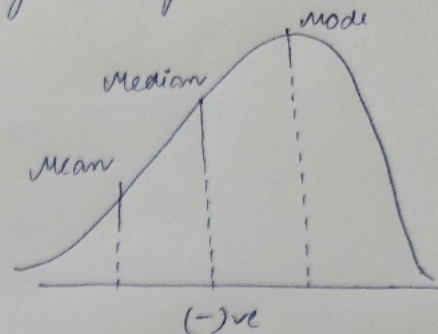
Q5. In left & right-skewed data, what is the relationship b/w mean, median & mode? Draw the graph to represent the same.



(+)ve

(Right skewed)

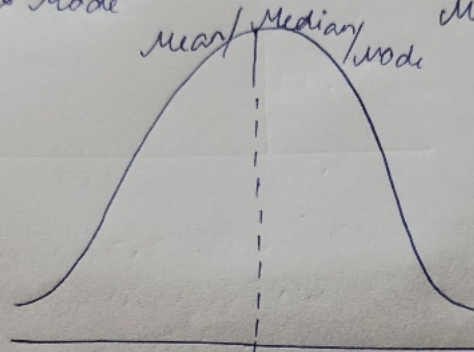
Mean > Median > Mode



(-)ve

(Left skewed)

Mean < Median < Mode



Normal distribution

Mean  $\approx$  Median  $\approx$  Mode