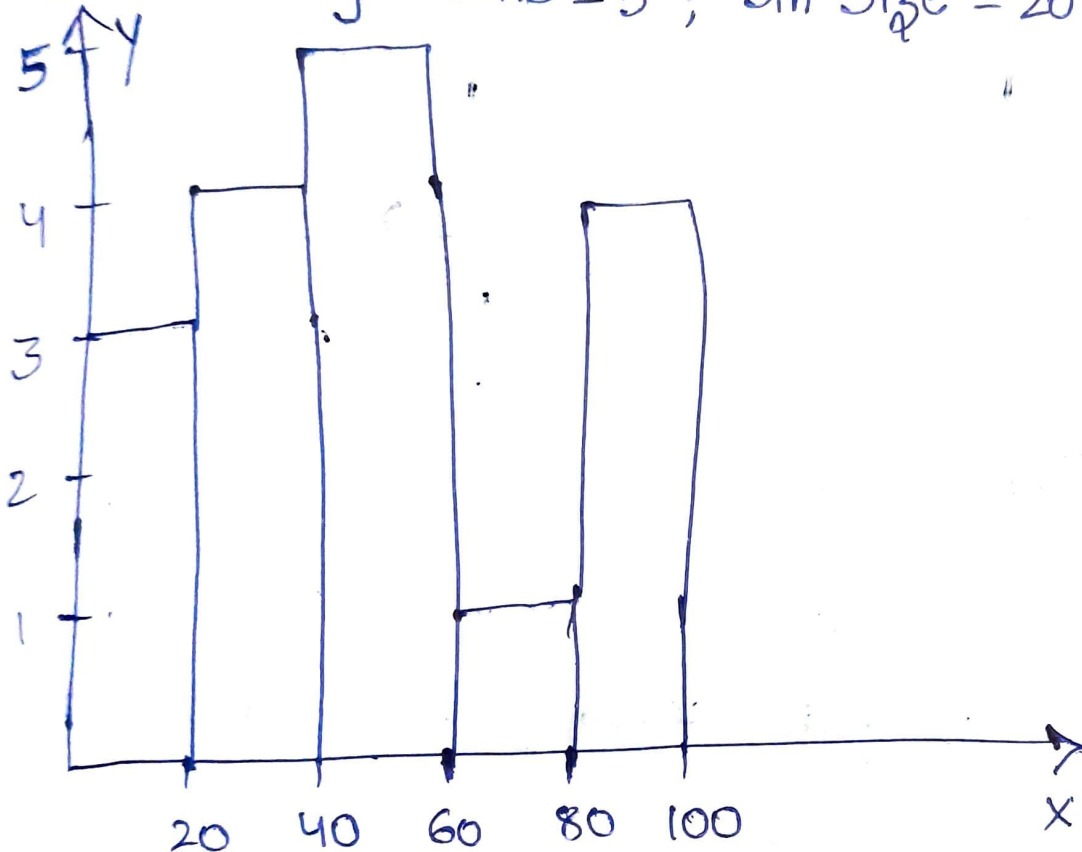


## Statistics Assignment - I

1) Plot a Histogram,

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

Sol: Considering bins = 5 ; bin size = 20.



2) 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% C.I about the mean-

Sol:  $\sigma = 100$

$$n = 25$$

$$\bar{x} = 520$$

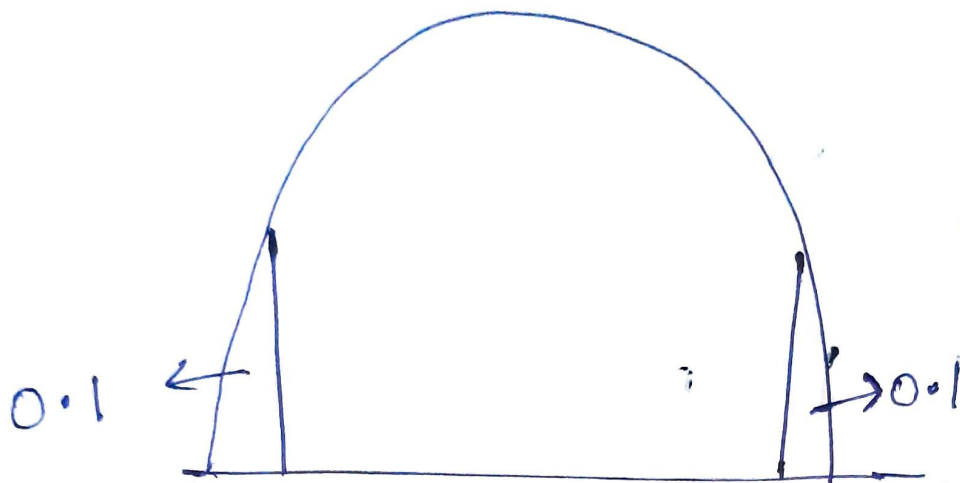
$$C.I = 80\%$$

$$\Rightarrow \alpha = 1 - C.I$$

$$= 1 - 0.8$$

$$= 0.2$$

$\Rightarrow$



$$\Rightarrow Z_{\alpha/2} = Z_{\frac{0.2}{2}}$$

$$= Z_{0.1}$$

$$\Rightarrow 1.28 \text{ (according to ztable.net)}$$

$$\rightarrow \text{Lower Fence} = \bar{x} - Z_{\alpha/2} \frac{\sigma}{\sqrt{n}}$$

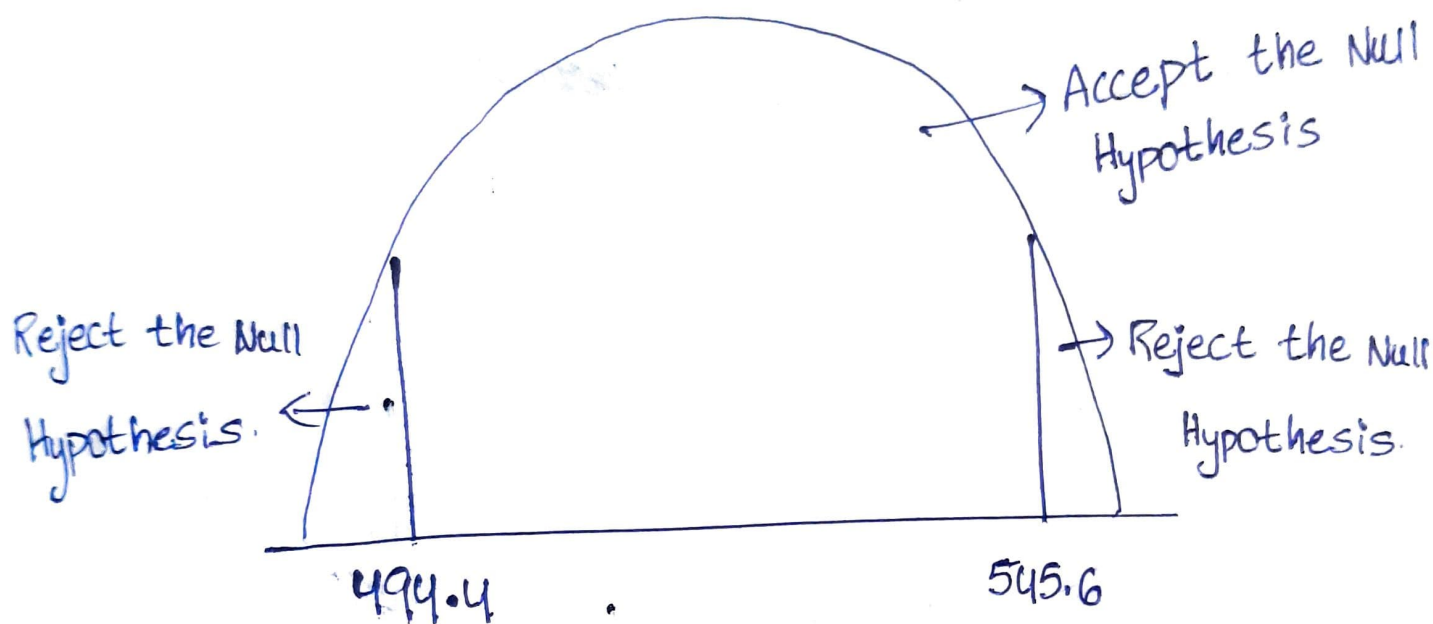
$$= 520 - 1.28 \left( \frac{100}{\sqrt{25}} \right)$$

$$= 520 - 1.28(20)$$

$$= 520 - 25.6$$

$$= 494.4$$

$$\begin{aligned}
 \rightarrow \text{Higher Fence} &= \bar{x} + z_{\alpha/2} \frac{\sigma}{\sqrt{n}} \\
 &= 520 + 1.28 \left( \frac{100}{\sqrt{25}} \right) \\
 &= 520 + 1.28(20) \\
 &= 520 + 25.6 \\
 &= 545.6
 \end{aligned}$$



3) A car believes that the percentage of citizens in the city ABC that owns a vehicle is 60% or less. A sales manager disagrees with this. He conducted 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 owners in ABC city is 60% or less.

Sol:-  $n=250$  ;  $n=170$

a)

$$H_0: P_0 \leq 60\%$$

$$H_1: P_0 > 60\% \Rightarrow p_0 = 40\%$$

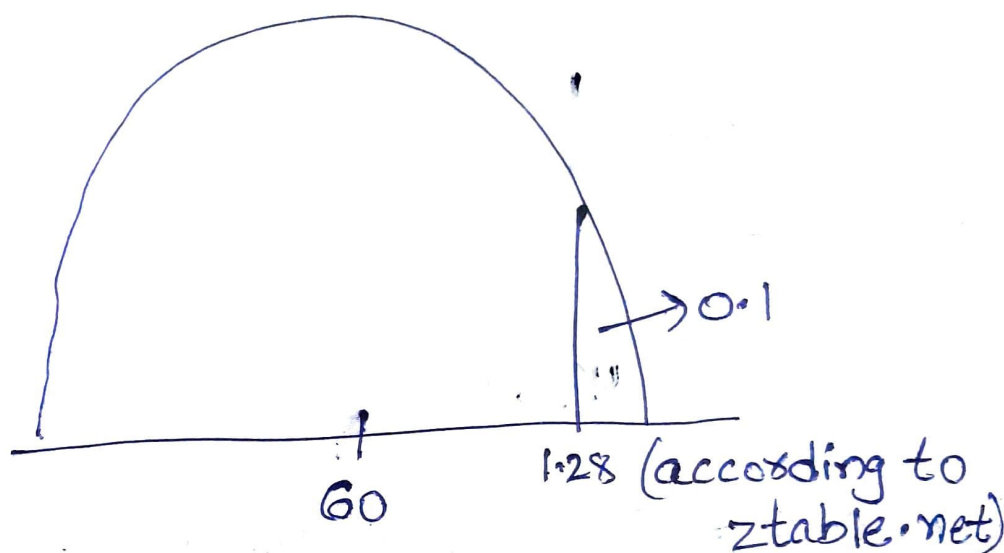
b)

~~10%~~ significance level = 10%.

~~$\alpha = 0.1$~~

$$\Rightarrow \alpha = 0.1$$

$\neq$



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

$$= \frac{170}{250}$$

$$= 0.68$$

$$z\text{-test} = \frac{\hat{P} - P_0}{\sqrt{\frac{P_0 q_0}{n}}}$$

$$= \frac{0.68 - 0.6}{\sqrt{\frac{0.68 \times 0.6}{250}}} = \frac{0.08}{\sqrt{\frac{0.408}{250}}} = \frac{0.08}{0.40} = 2$$



$\Rightarrow 2 > 1.29$  (Reject the Null Hypothesis)

$\Rightarrow$  Percentage of citizens in the city ABC that owns a vehicle is more than 60%.

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

Sol:-  $n = 20$ .

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

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

$$= 20.79$$

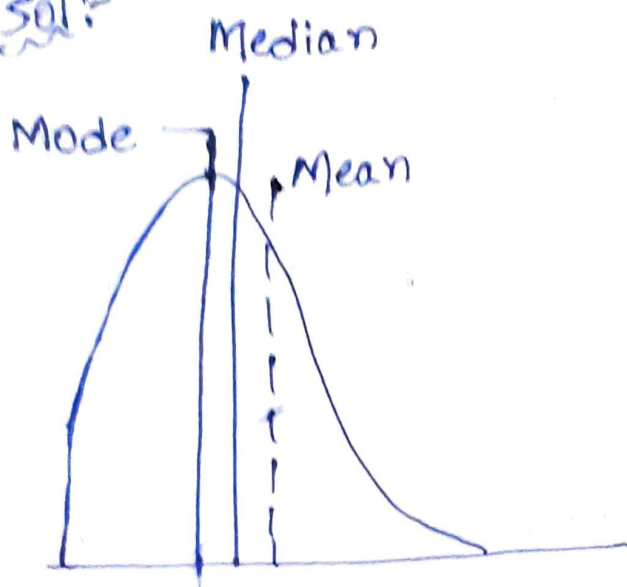
$\rightarrow$  Here the maximum index is 20. There is no 21<sup>st</sup> index to get the mean of 20 and 21 index as:  
We got 20.79.

$$\Rightarrow 99 \text{ percentile value} = 12 \text{ (20<sup>th</sup> index)}$$

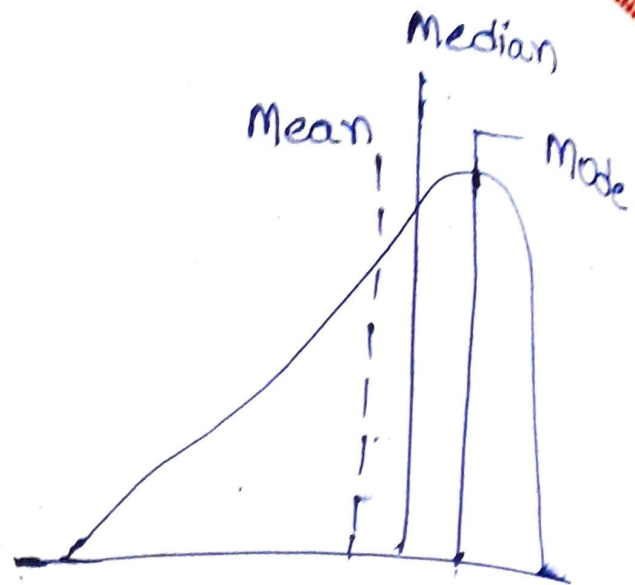
5) In left & right-skewed data, what is the relationship between mean, median & mode?

Draw the graph to represent the same.

Sol:-



Right skewed Distribution



Left skewed Distribution.