

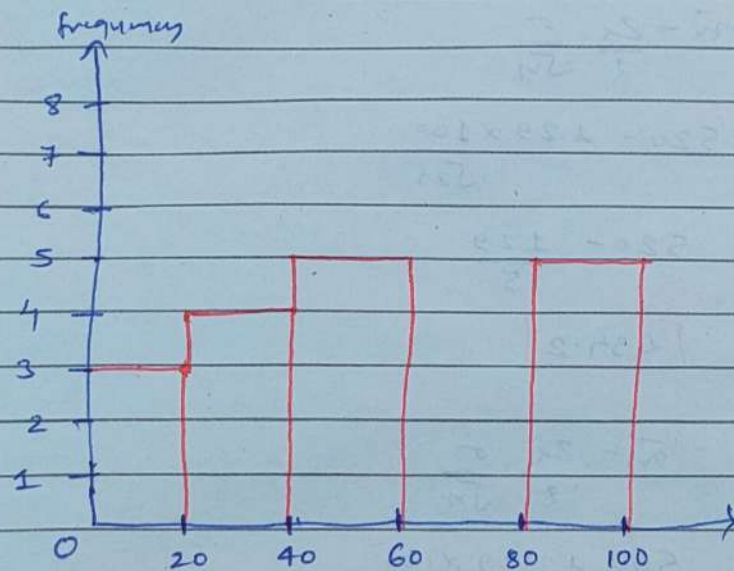
## Assignment 1

#① Plot a Histogram

10, 12, 18, 22, 27, 32, 38, 40, 45, 51, 56, 57, 88, 90, 92, 94, 99

Bin = 5

Bin Size = 20



#

② In a quant test of 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.

Sol

Given

$\sigma = 100$

$n = 25$

$\bar{x} = 520$

CI = 80%

$\alpha = 1 - CI$

$\alpha = 1 - 0.80$

$\alpha = 0.20$

$$\frac{Z_{\alpha}}{2} = \frac{Z_{0.20}}{2} = Z_{0.10}$$

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

$$Z_{0.10} = 1.29$$

Lower fence  $\Rightarrow \bar{x} - \frac{Z_{\alpha}}{2} \frac{\sigma}{\sqrt{n}}$

$$520 - \frac{1.29 \times 100}{\sqrt{25}}$$

$$520 - \frac{129}{5}$$

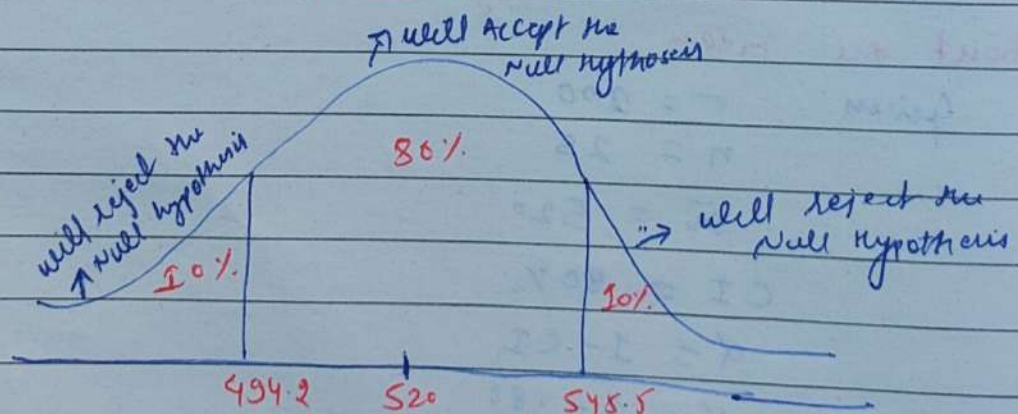
$$494.2$$

Higher fence  $\Rightarrow \bar{x} + \frac{Z_{\alpha}}{2} \frac{\sigma}{\sqrt{n}}$

$$520 + \frac{1.29 \times 100}{\sqrt{25}}$$

$$520 + \frac{129}{5}$$

$$545.8$$





Note: If CI is 494.2 to 548.2 then will accept the null hypothesis

If data point is less than 494.2 or data point is more than 548.2 then will reject the null hypothesis

Q.3 A car believes that the percentage of citizens in city ABC that owns a vehicle is 60% or less. A sales manager disagree 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. (4)

2) At a 10% significance level, is there enough evidence to support the idea that vehicle owned in ABC city is 60% or less

Sol

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

$$\alpha = 1 - 0.60$$

$$H_1: P_2 \geq 60\%$$

$$\alpha = 0.40$$

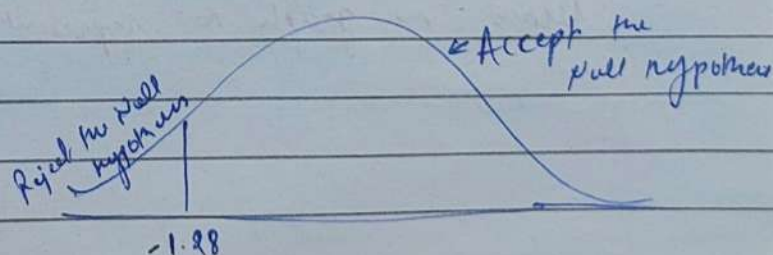
$$n = 250$$

$$x = 170$$

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

$$\alpha = 0.10$$

$$Z_{0.10} = -1.28$$



$$Z_{test} = \frac{\hat{p} - p_0}{\sqrt{\frac{p_0 q_0}{n}}} = \frac{0.68 - 0.60}{\sqrt{\frac{0.60 \times 0.40}{250}}}$$

$$Z_{test} = \frac{0.08}{\sqrt{\frac{0.24}{250}}} = 2.588$$

$2.588 > -1.28$  we accept the null hypothesis

Q4 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

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

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

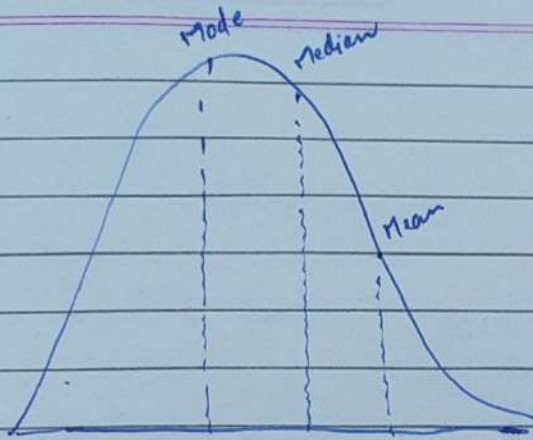
$$= 20.79 \text{ (Index Position)}$$

$$\boxed{\text{Value} = 12}$$

Q5 In left & right skew data, what is the relationship between mean, median & mode?

Draw the graph to represent the same

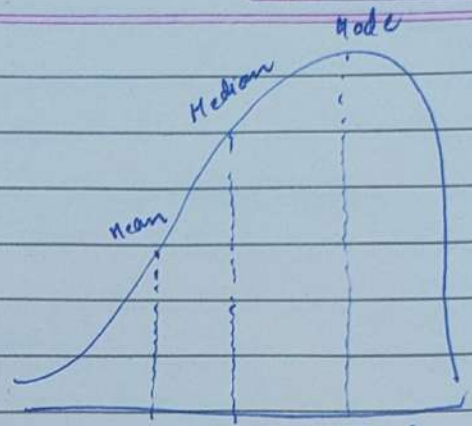




(+ve)

(Right skew)

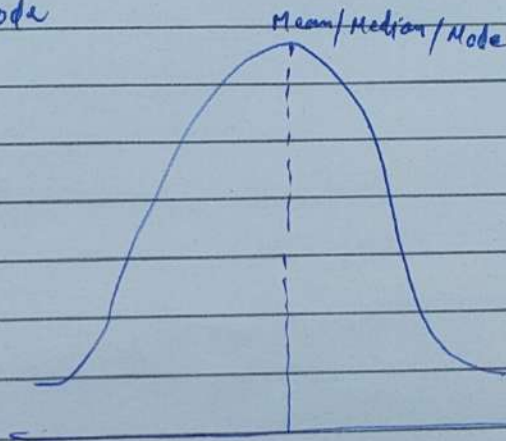
$Mean > Median > Mode$



(-ve skew)

(Left skew)

$Mean < Median < Mode$



Normal Distribution

$Mean \approx Median \approx Mode$