Statistics Assignment - 1 :

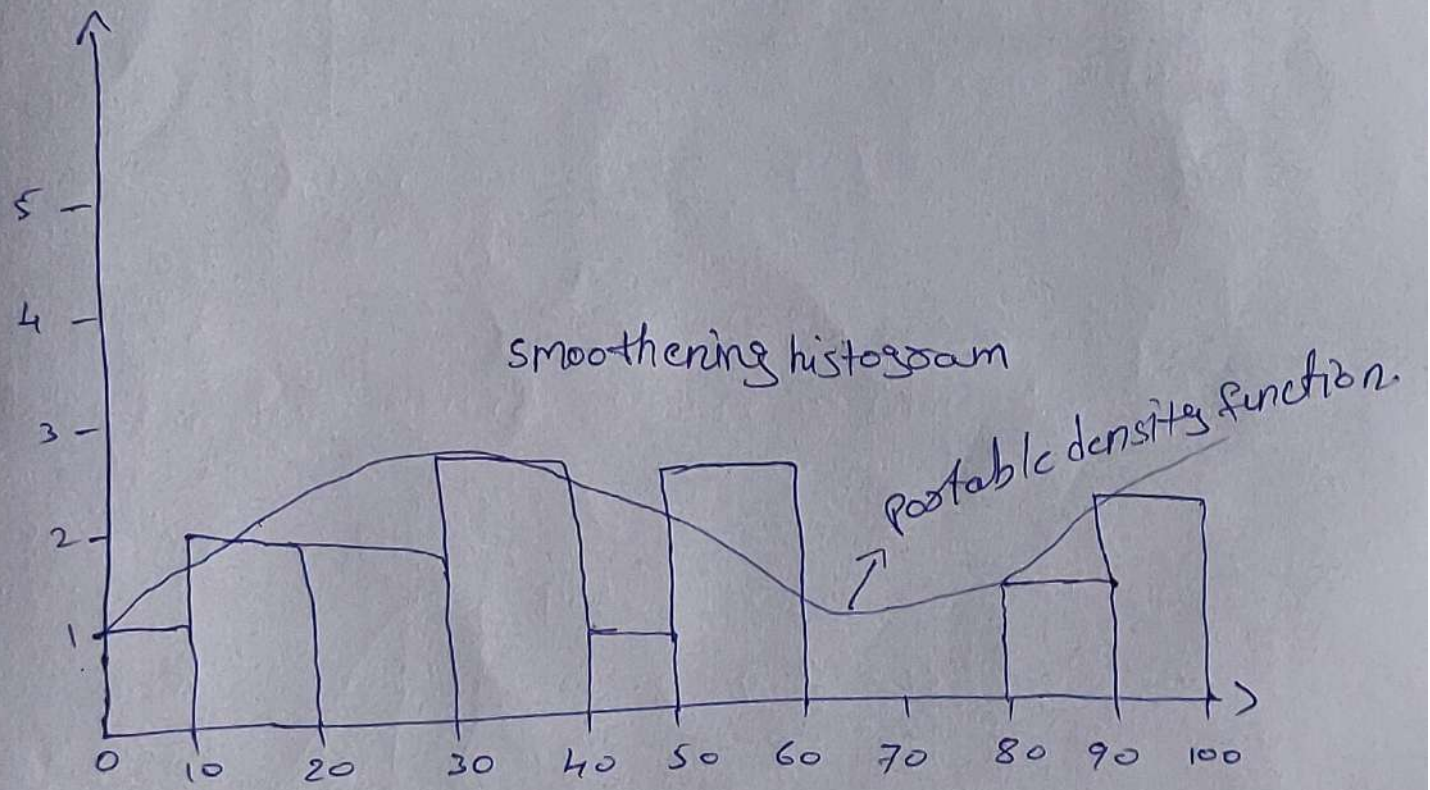
1) Plot a histogram,

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

1. sort the numbers in ascending order.
2. Bins → No. of groups
3. Bins size → size of Bins

Bins = 10

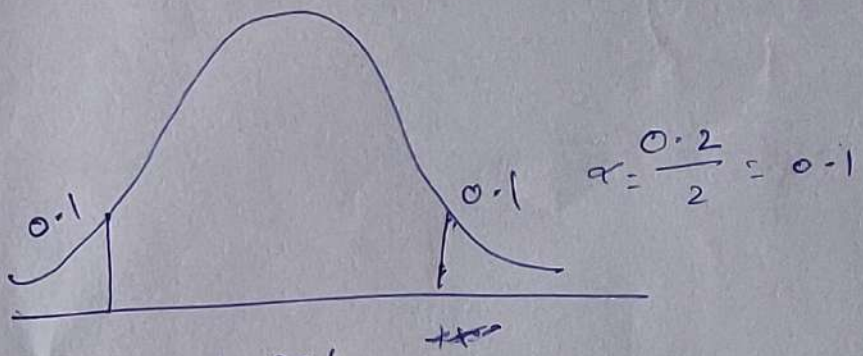
Bins size = $\frac{100}{10}$ = 10



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.

$n = 25$, $\sigma = 100$, C.I = 80%. $\bar{x} = 520$

$\alpha = 0.2$



$\alpha = \frac{0.2}{2} = 0.1$

$1 - 0.1$

$= 0.9$

from z-table

1.28

Higher limit $= \bar{x} + z_{\frac{\alpha}{2}} \frac{\sigma}{\sqrt{n}}$

$= 520 + z_{\frac{0.2}{2}} \times \frac{100}{\sqrt{25}}$

$= 520 + z_{0.1} \times \frac{100}{5}$

$= 520 + 1.28 \times 20$

$= 520 + 25.6$

$= 545.6$

Lower limit $= \bar{x} - z_{\frac{\alpha}{2}} \frac{\sigma}{\sqrt{n}}$

$= 520 - 1.28 \times \frac{100}{\sqrt{25}}$

$= 520 - 1.28 \times 20$

$= 520 - 25.6$

$= 494.4$

[494.4 $\xrightarrow{\text{C.I 80\%}}$ 545.6]

$h_0 = \mu = 520$

$h_1 = \mu \neq 520$

$$\frac{494.4 + 545.6}{2} = \frac{1040.6}{2} = 520.3$$

Accept the null hypothesis.

3) A car believes that the percentage of citizens in 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

a)

$h_0 = P_0 = 60\%$

$h_1 = P_0 \neq 60\%$

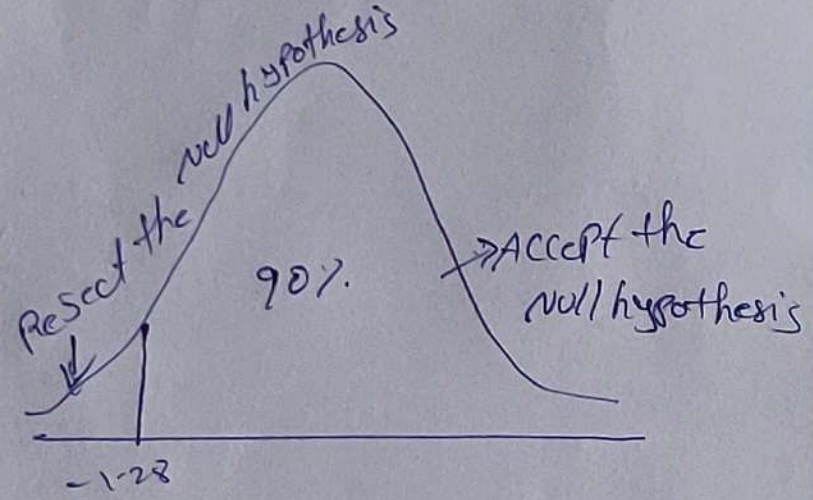
$n = 250$

$x = 170$

$\alpha = 0.1$ C.I = 90%

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

$q_0 = 1 - P_0 = 1 - 0.6 = 0.4$



$\alpha = 0.1$

$1 - 0.1 = 0.9$

From z table

1.28

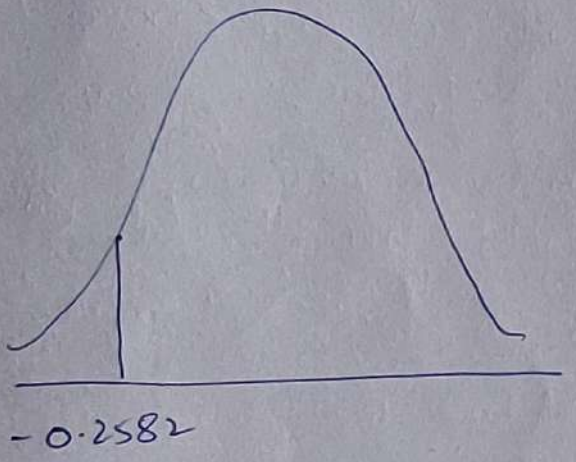
$$\text{Z test} = \frac{\hat{p} - p_0}{\sqrt{\frac{p_0 q_0}{n}}} = \frac{0.68 - 0.6}{\sqrt{\frac{0.6(0.4)}{250}}} = \frac{0.08}{\sqrt{0.00096}}$$

$$= \frac{0.08}{0.03098} = 0.2582$$

$-1.28 < 0.2582$

Accept the Null hypothesis

P - value :-



$\alpha = 0.1$

P-value = 0.40129

$1 - 0.40129 = 0.59871$

$0.1 < 0.40129$

Accept the Null hypothesis.

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 -> 20 values

$$\text{Value} : \frac{\text{percentile}}{100}(n+1)$$

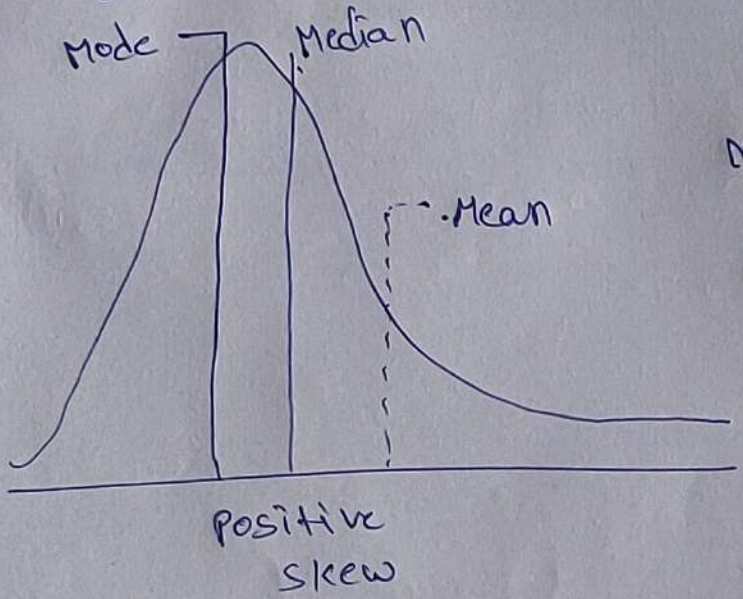
$$= \frac{99}{100}(20+1)$$

$$= 20.7 \rightarrow \text{Index}$$

5) In left & right-skewed data, what is the relationship between mean, median & mode? Draw the graph to represent the same.

Right skewed:

A right skewed is one in which the tail is on the right side.

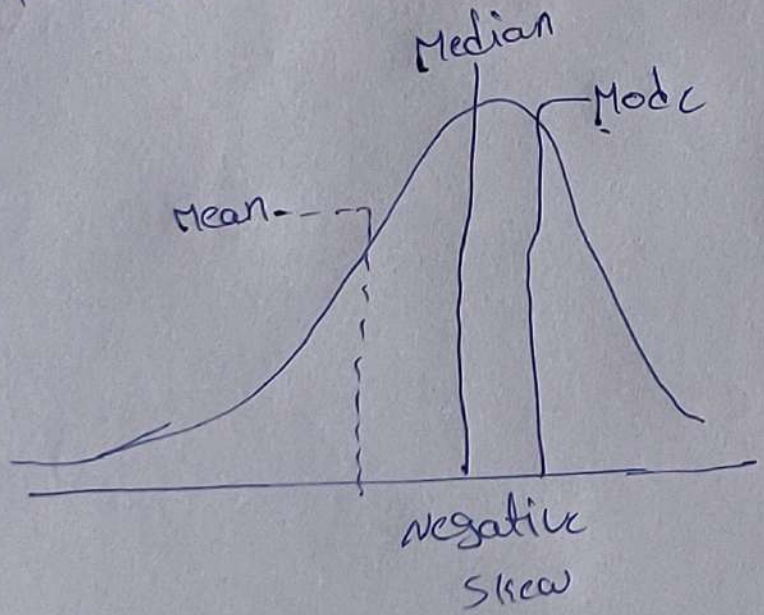


Mean > Median > Mode

Eg:- 1. Wealth distribution
2. Length of comments
3. Movive tickets.

Left skewed:

A left skewed is one in which the tail is on the left side.



Mode > Median > Mean

Eg:- Life span of human being.