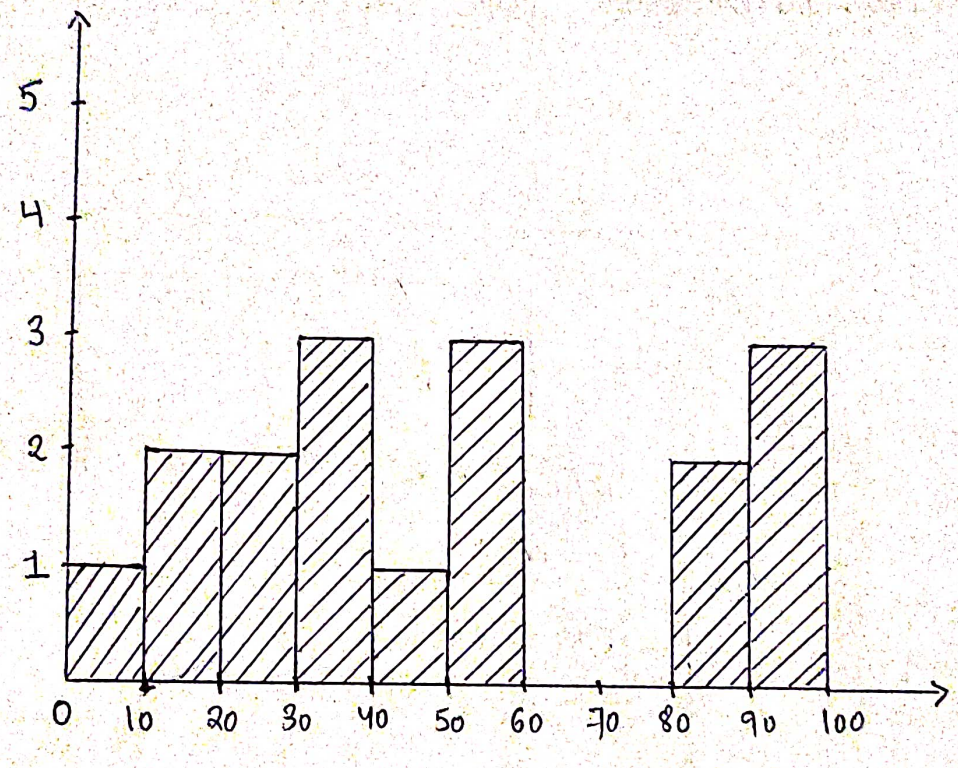
Q1) Plot a histogram.

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

Soln. ⇒ By taking Bins as 10



Q2) 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.

Soln ⇒ Standard deviation $\sigma = 100$

Sample $n = 25$

Sample mean $\bar{x} = 520$

Significance value $\alpha = 0.2$

$\therefore Z_{\alpha/2} = Z_{\frac{0.2}{2}} = Z_{0.1}$

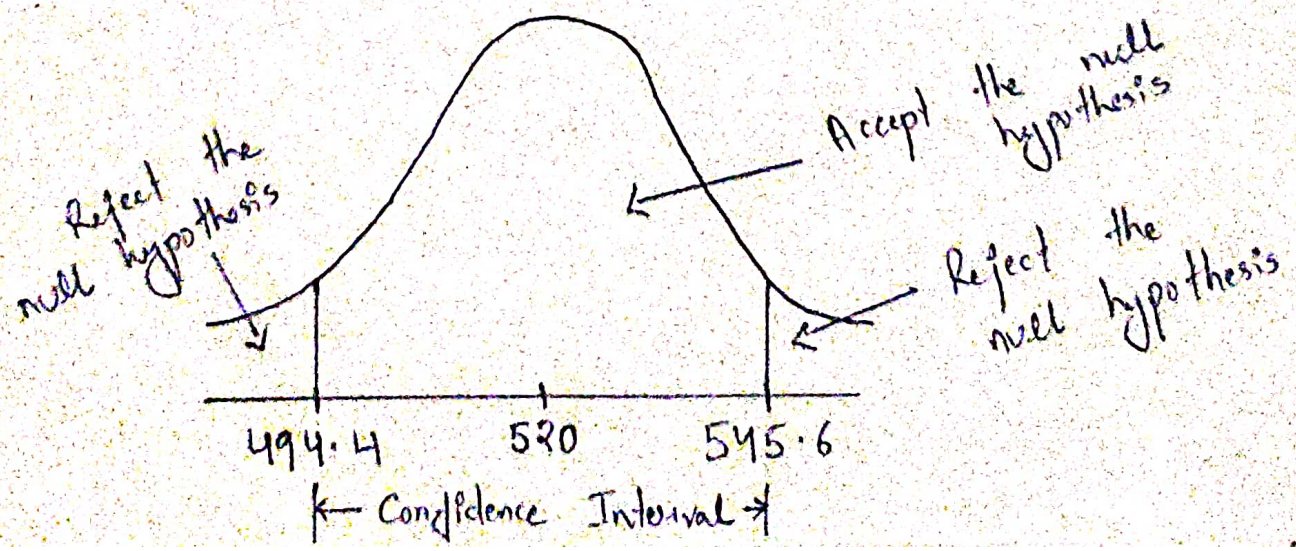
From Z table, we got $Z_{\alpha/2}$ value as 1.28

Hence, Lower fence $= \bar{x} - Z_{\alpha/2} \frac{\sigma}{\sqrt{n}}$

$= 520 - 1.28 \times \frac{100}{\sqrt{25}} = 494.4$

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

$= 520 + 1.28 \times \frac{100}{\sqrt{25}} = 545.6$



93) A car company 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 and 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.

Soln. ⇒ Null hypothesis $H_0 : P_0 \leq 60\%$.

Alternate hypothesis $H_1 : P_1 > 60\%$.

$n = 250$

$x = 170$

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

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

Significance value $\alpha = 0.1 = -1.28$

Z-test with proportion

$$Z = \frac{\hat{p} - P_0}{\sqrt{\frac{P_0 q_0}{n}}} = \frac{0.68 - 0.6}{\sqrt{\frac{0.6 \times 0.4}{250}}} = 2.58$$

$\because 2.58 > -1.28 \therefore$ Reject the null hypothesis

$\therefore$ % of car ownership in city ABC is more than 60%.

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

Soln. ⇒ The value of the 99 percentile is

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

Here $n = 20$

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

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

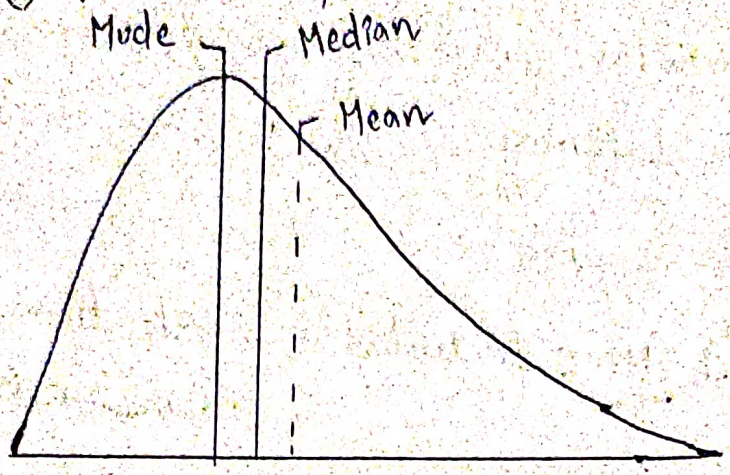
$= 20.79$ ⇒ Index

∴ From given dataset, we got index value of 20.79 as 12.

∴ The value of 99 percentile is 12.

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

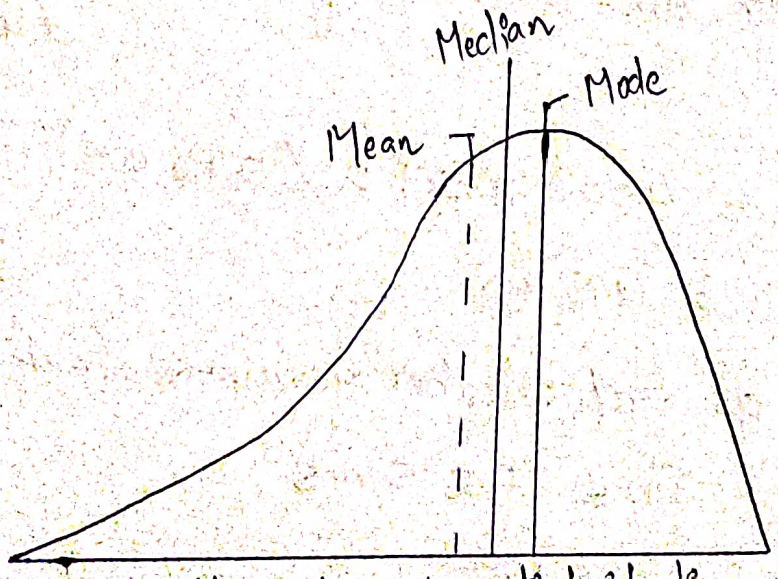
Soln. ⇒



Right skewed distribution

In Right skewed distribution, mean is greater than median and median is greater than mode

Mean > Median > Mode



Left skewed distribution

In Left skewed distribution, mode is greater than median and median is greater than mean

Mode > Median > Mean