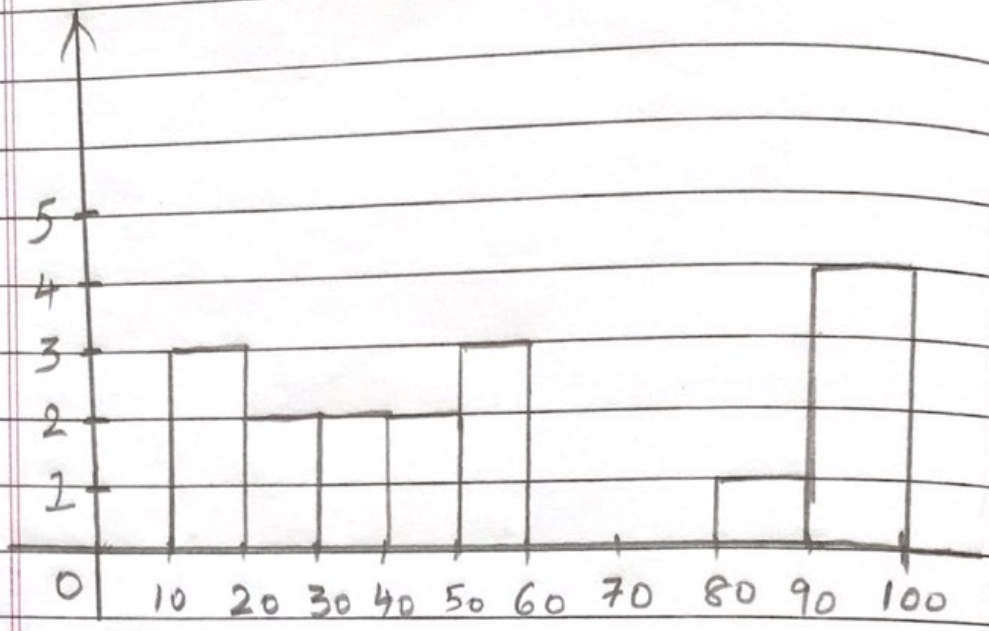
Statistics Assignment 1

Q 1) Plot a histogram

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

Bins = 10



Q 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% CI about the mean.

(Standard deviation) $\sigma = 100$ (Sample) $n = 25$ (Sample mean) $\bar{x} = 520$

C.I = 80%

$\alpha = 1 - C.I$

$= 1 - 0.80 = 0.2$

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Point Estimate $\pm$ Margin of Error

$$\bar{x} \pm Z_{\alpha/2} \frac{\sigma}{\sqrt{n}}$$

$Z_{\alpha/2}$

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

Z score = 1.29

$\frac{\sigma}{\sqrt{}} = \frac{100}{\sqrt{25}} = 20$

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

$= 520 - 1.29 \times 20$

$= 520 - 25.8$

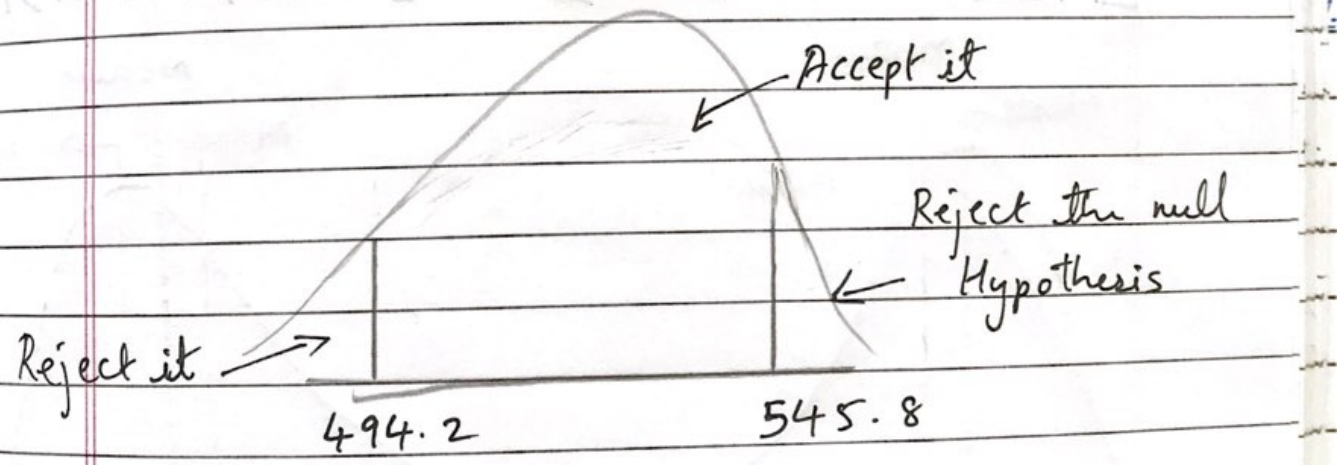
Lower Fence $= 494.2$

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

$= 520 + 1.29 \times 20$

$= 520 + 25.8$

Higher Fence $= 545.8$



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

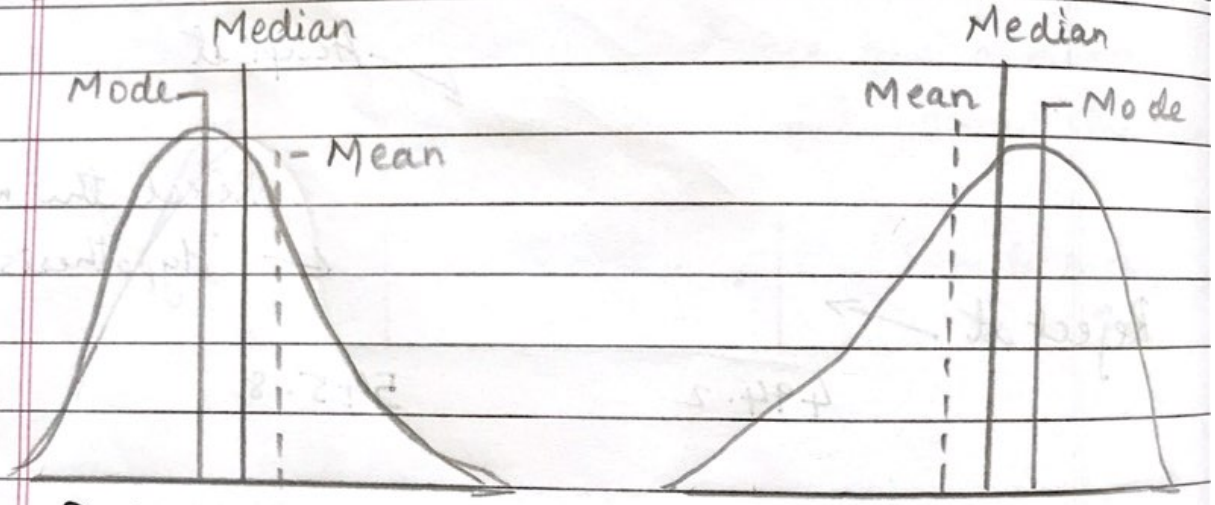
$$\text{Value} = \frac{\text{Percentile}}{100} \times (n+1)$$

$$= \frac{99}{100} \times (20+1) = \underline{\underline{20.79}} \text{ - Index}$$

20.79 index position indicates 20 is the value of the 99 percentile.

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

[Mean > Median > Mode] [Mode > Median > Mean]



Positive skew OR Right skewed

Negative skew OR Left skewed.

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Q3) 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 owing 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.

Ans Null hypothesis P0 (Proportion) city ABC owns a vehicle 60% or less.

Alternate hypothesis is City ABC owns a vehicle 60% or more.

* This is a 1 tail diagram

Here, $n = 250$, $x = 170$, $P_0 = 0.60$

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

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

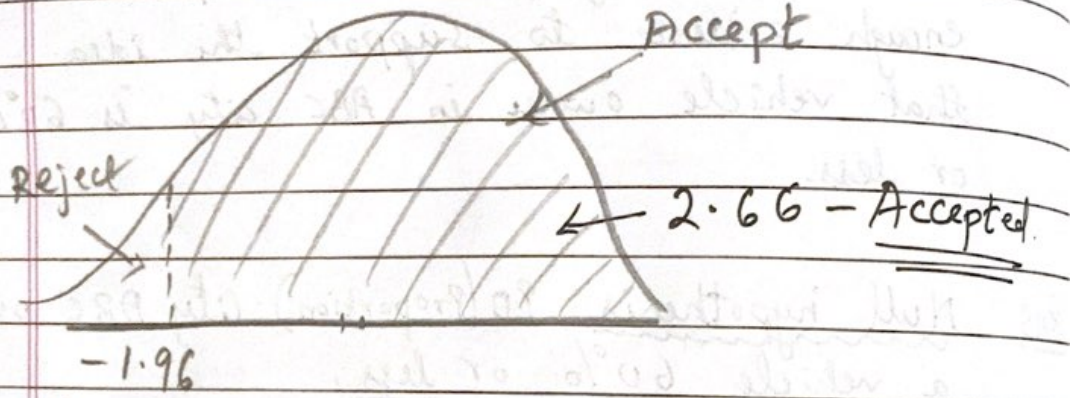
$$\alpha = 1 - 10\% = 0.9$$

Z-Test with proportion $= \frac{\hat{P} - P_0}{\sqrt{\frac{P_0 q_0}{n}}}$

$= \frac{0.68 - 0.60}{\sqrt{\frac{0.6 \times 0.4}{250}}}$

$= 2.66$

$2.66 > -1.96$



Hence, we conclude that vehicle owner in the ABC city is 60% & more.