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STATISTICS

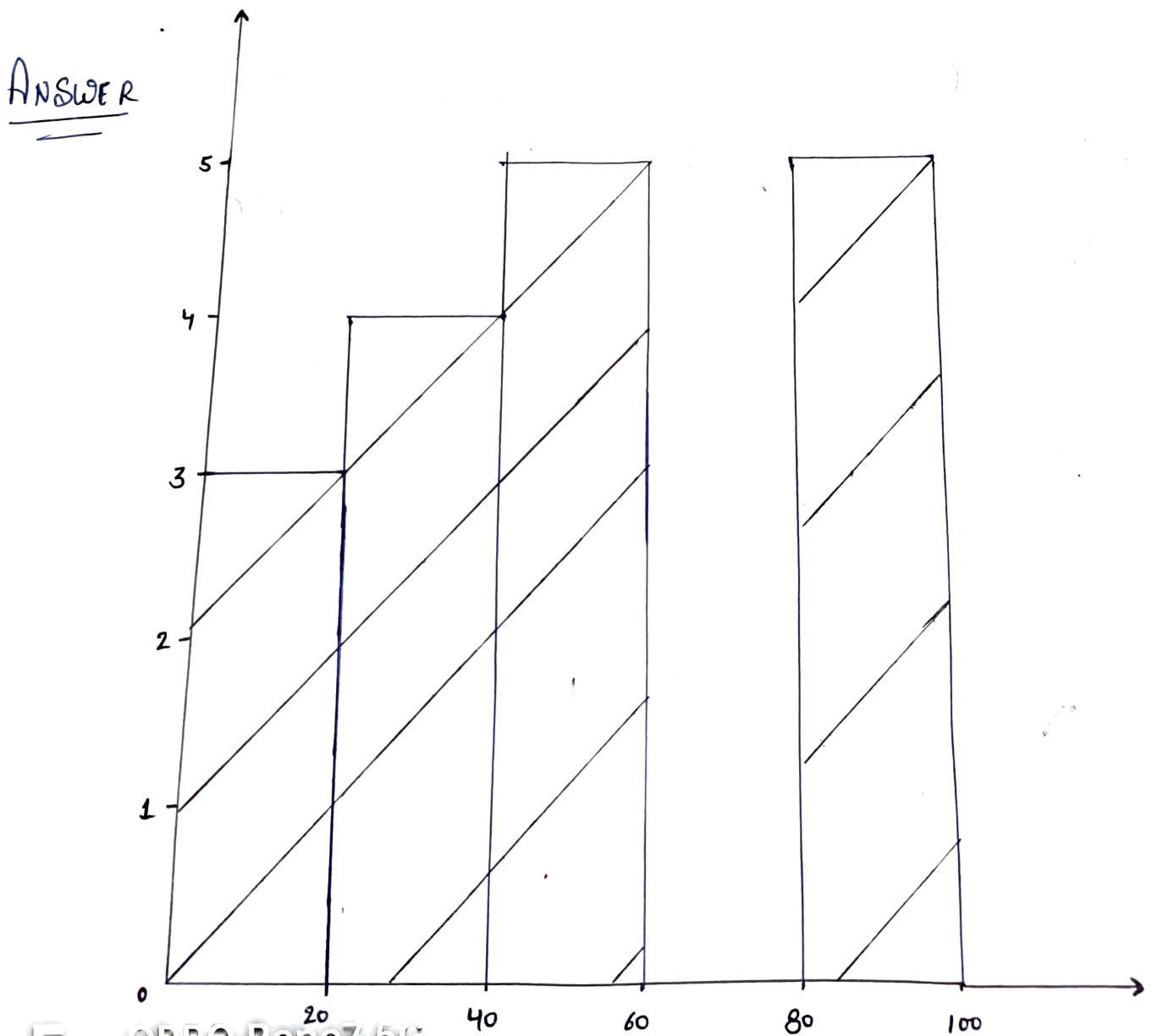
ASSIGNMENT - 1

Q1) PLOT A HISTOGRAM

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

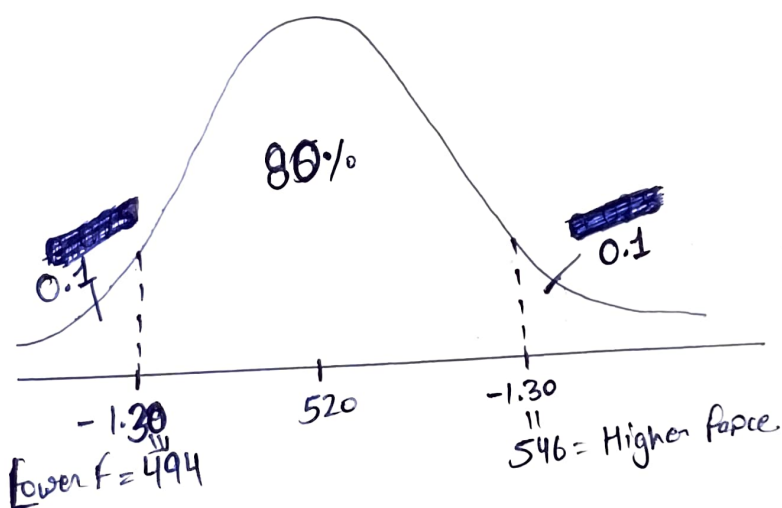
⊙ Bins = 5

⊙ Bins Size = 20



Q-2 IN A Quapt Test of the CAT Exam, the Population Standard Deviation is known to be 100. A Sample of 25 test taken had a Mean of 520. Construct an 80% CI about the Mean.

Answer Given \rightarrow $SD(\sigma) = 100$
 $\bar{x} = 520$
 $n = 25$



total Area = 1

~~0.9~~

$$1 - 0.1 = 0.9$$

Value of 0.9 in Z-Score table = 1.30 (Approx)

Formula

$$\text{Lower/upper force} = \bar{x} \pm Z_{\alpha/2} \left[\frac{\sigma}{\sqrt{n}} \right]$$

$$\begin{aligned} \text{Lower force} &= \bar{x} - Z_{\alpha/2} \left[\frac{\sigma}{\sqrt{n}} \right] \\ &= 520 - 1.30 \times \frac{100}{\sqrt{25}} \\ &= 520 - 1.30 \times 20 \\ &= 520 - 26 \\ &= 494 \end{aligned}$$

$$\begin{aligned} \text{Higher force} &= \bar{x} + Z_{\alpha/2} \left[\frac{\sigma}{\sqrt{n}} \right] \\ &= 520 + 1.30 \times \frac{100}{\sqrt{25}} \\ &= 520 + 26 \\ &= 546 \end{aligned}$$

$$\text{Higher force} = 546$$

Q3. 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 & found that 170 Residents Responded yes to owning a vehicle.

- Q. State the null & alternative Hypothesis.
 Q. At a 10% Significance level, is there enough evidence to support the idea that vehicle owner in ABC city is 60% or less.

Answer Given :-
 $n = 250$ $\alpha = 0.1$ (Significance level)
 $x = 170$

$$P_0 = 0.6$$

$$Q_0 = 0.4$$

$$CI = 90\%$$

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

$$\therefore \text{Hint Given by Sir}$$

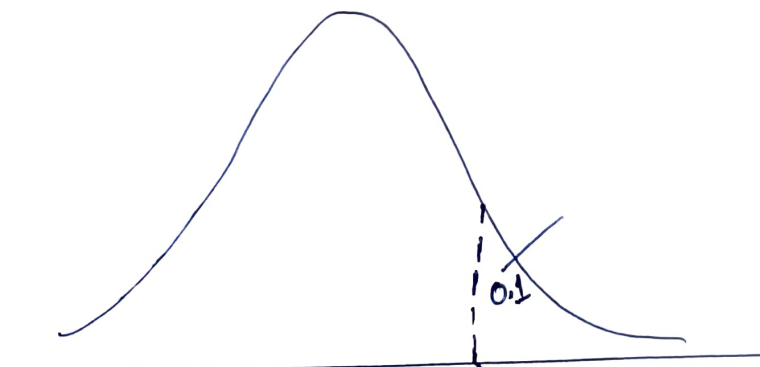
$$P\text{-value} = 0.014$$

- ① Null Hypothesis (H_0) $\leq 60\%$
 Altern " (H_1) $> 60\%$

② $\alpha = 0.1$, $CI = 90\%$

③

[Note = Give one-tail test]



④ Formula

$$Z = \frac{\hat{p} - p_0}{\sqrt{\frac{p_0 q_0}{n}}} = \frac{0.68 - 0.60}{\sqrt{\frac{0.6 \times 0.4}{250}}} = \frac{0.08}{0.0309} = 2.58$$

⑤ Conclusion

$$2.58 > 2.20$$

Reject 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

$$\text{Value} = \frac{\text{Percentile}}{100} \times (N)$$

$$= \frac{99}{100} \times 20 = 19.8^{\text{th}} \text{ Index}$$

$$\frac{19^{\text{th}} \text{ Index} + 20^{\text{th}} \text{ Index}}{2} = \frac{11 + 12}{2} = 11.5$$

Answer

Q5 In left & Right - Skewed Data, what is the relationship between Mean, Median & Mode? Draw the Graph to Represent the Same.

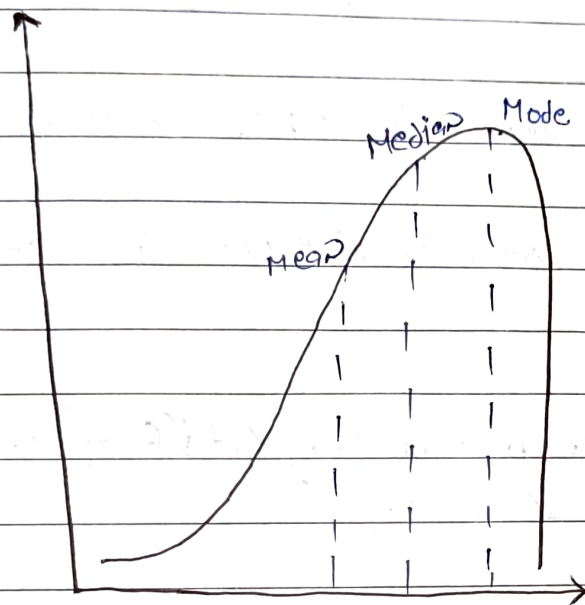
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(*) Left Skewed Distribution v/s Right Skewed Distribution

Skewness is a way to describe the Symmetry of a distribution.

⊙ Left Skewed Distribution

A Distribution is left skewed if it has a "tail" on the left side of the distribution.



Note → that ~~left~~ left skewed distributions are sometimes called "negatively skewed" distributions.

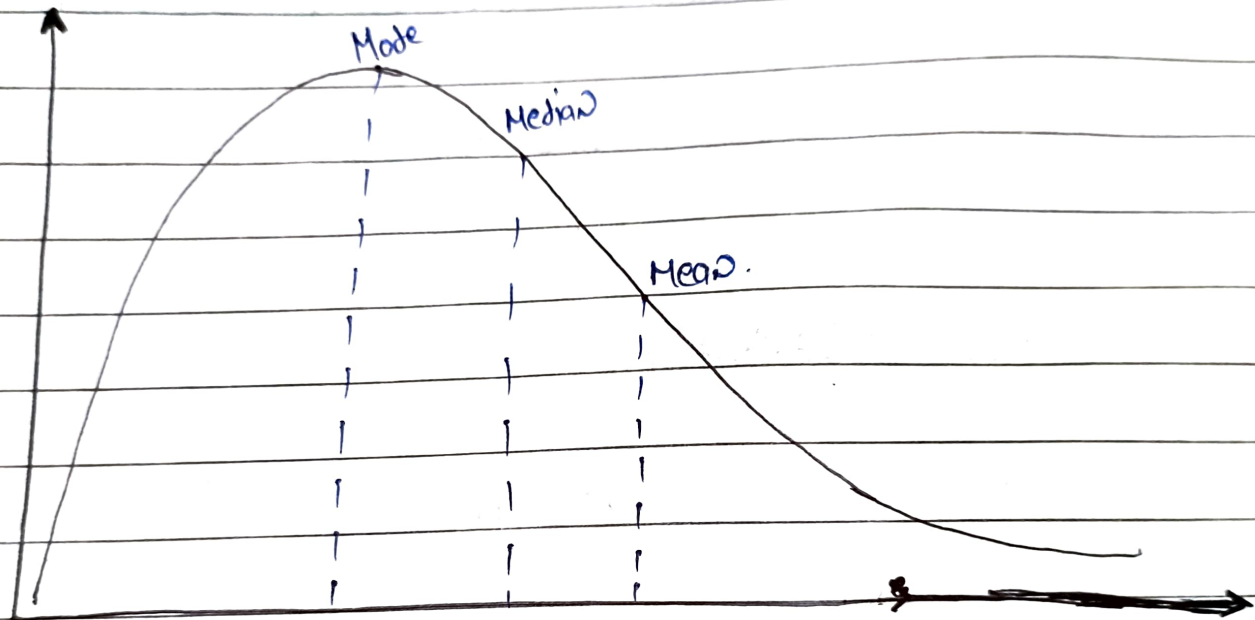
⊙ Left Skewed Distribution :- $\text{Mean} < \text{Median} < \text{Mode}$.

In a ~~left~~ left skewed distribution, the Mean is less than the Median.

⊙ Right Skewed Distribution

A Distribution is Right skewed if it has a "tail" on the Right side of the distribution.

Note → Right Skewed Distribution are sometimes called "Positively Skewed" distributions.



Right Skewed Distribution

Right Skewed Distribution \rightarrow $\text{Mode} < \text{Median} < \text{Mean}$

In a Right Skewed Distribution, the Mean is greater than Median