ASSIGNMENT - 1

Date __/__/____ STATISTICS

Saathi

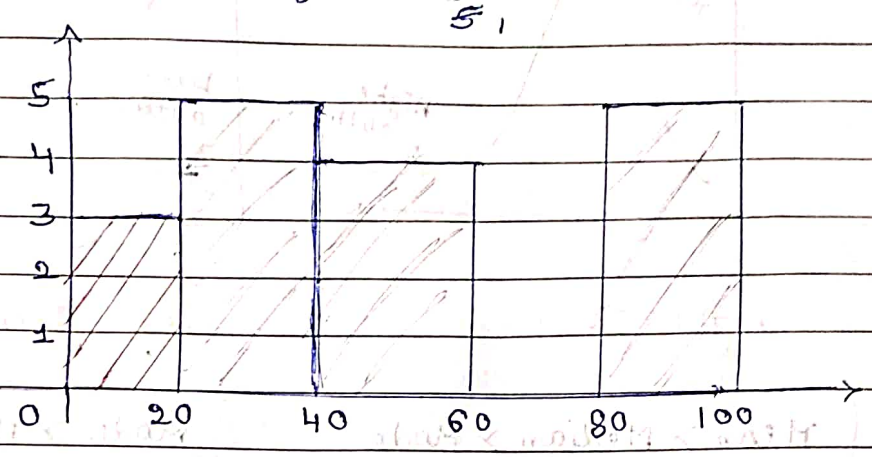
① Plot a histogram.

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

Soln:

Assume; bins = 5

$$\text{bin size} = \frac{100}{5} = 20$$



② 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:

$$\text{value} = \frac{\text{Percentile} \times n}{100}$$

$$\text{value} = \frac{99}{100} \times 20$$

$$\text{value} = 19.8 \rightarrow \text{Index}.$$

19.8 index is 12.

value of 99 percentile is 12

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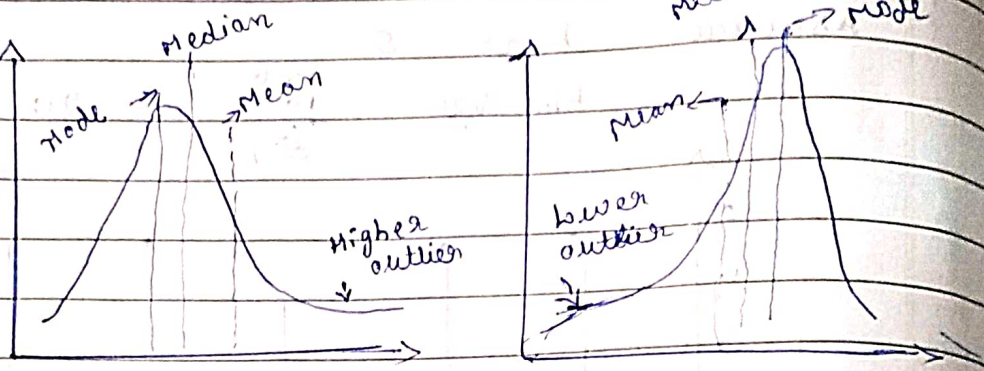
Date ___/___/___

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

Sol :-



Right Skewed

Mean > Median > Mode

Left Skewed

Mode > Median > Mean

Examples :-

(1) Right Skewed :-

(i) Wealth distribution
(ii) Length of Comments.

(2) Left Skewed :-

(i) Life Span of Human

Date __/__/____

Saathi

(4) 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.

Sol:- Given :- $\bar{x} = 520$, $S.D(\sigma) = 100$

$n = 25$, $CI = 80\%$

$\alpha \Rightarrow 1 - C.I$

$= 1 - 0.80 = 0.2$

$\boxed{\alpha = 0.2}$

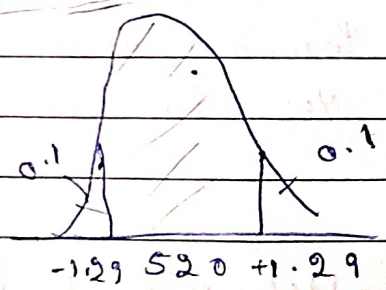
Point Est $\pm$ Margin Error : Std Error

$$\boxed{\bar{x} \pm Z_{\alpha/2} \frac{\sigma}{\sqrt{n}} \Rightarrow \text{Std Error}}$$

$$Z_{\alpha/2} = \frac{Z_{0.2}}{2} = Z_{0.1} = 1.29$$

$1 - 0.1 = 0.9$

Z-table $= 1.29$



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

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

$= 520 - 1.29 \times 20$

$= 494.2$

Page No.

Saathi

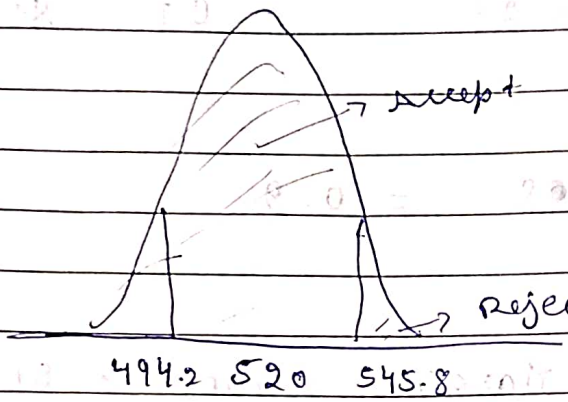
Date ___/___/___

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

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

$= 520 + 1.29 \times 20$

$= 545.8$



(5) A Car believes that the percentage of Citizens in city ABC that own a cycle 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 owner in ABC City is 60% or less.

Date __/__/____

Saathi

Sol:- ① $H_0 : P_0 = 60\%$ $\quad n = 250 \quad x = 170$

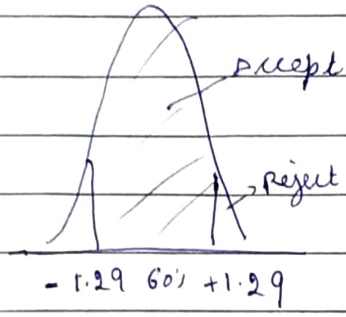
$H_1 : P_0 \neq 60\%$

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

$$P_0 = 0.6 \,, \quad q_0 = 1 - P_0 = 1 - 0.6 = 0.4$$

② $\alpha = 0.1$

③



④ Z- test of Proportion

$$Z \text{ test} = \frac{\hat{P} - P_0}{\sqrt{\frac{P_0 q_0}{n}}}$$

$$= \frac{0.68 - 0.6}{\sqrt{\frac{0.6 \times 0.4}{250}}} \Rightarrow \frac{0.08}{\frac{0.489}{15.811}}$$

$$= \boxed{2.58}$$

$2.58 > 1.29$ Reject alternate Hypothesis

Page No.