

NAME - RISHOB GHOSH

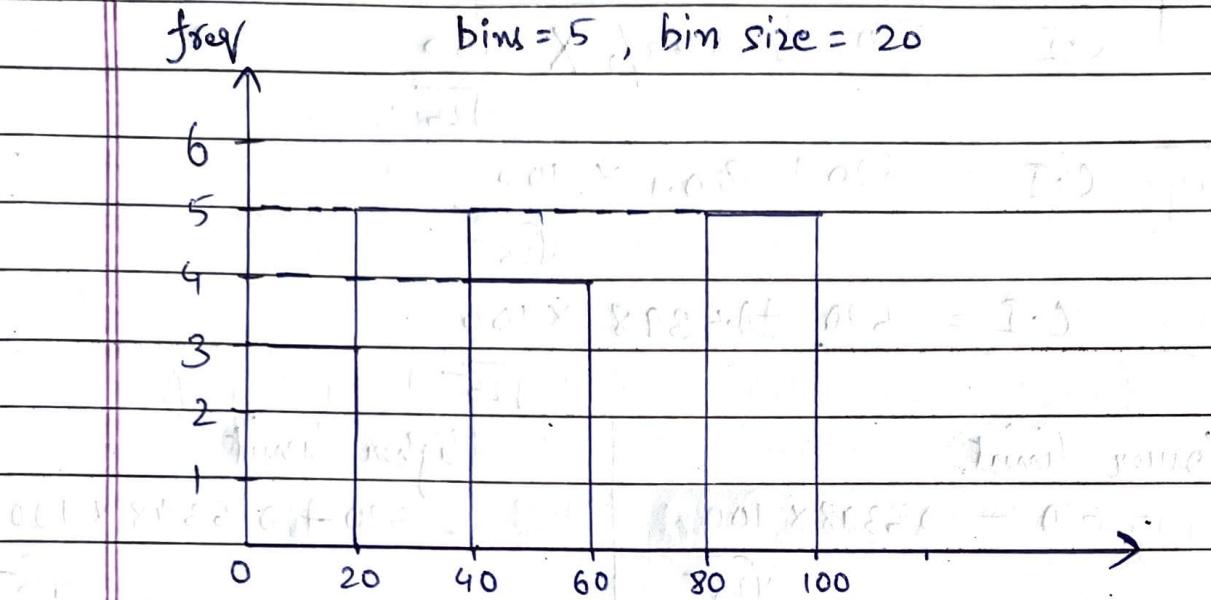
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Statistics - Assignment

Q1. Plot a histogram

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



Q2. In an quant test of the CAT Exam, the population standard deviation is Known to be 100. A Sample of 25 test have a mean of 520. Construct a 80% CI about the mean.

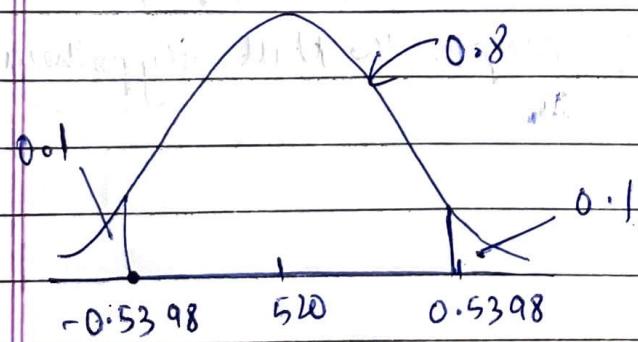
$$\sigma = 100, n = 25, \bar{x} = 520$$

$$H_0 \left\{ \mu = 520 \right.$$

$$H_1 \left\{ \mu \neq 520 \right.$$

$$\therefore 1 - C.I = 0.2$$

$$1 - 0.8 = 0.2$$



$$0.1 \downarrow \text{(z-table)}$$

0.5398

Teacher's Signature.....

C.I = Point Estimate \pm margin of Error

$$C.I = \bar{x} \pm z_{\alpha/2} \times \frac{\sigma}{n}$$

$$C.I = 520 \pm z_{0.2/2} \times \frac{100}{\sqrt{25}}$$

$$C.I = 520 \pm z_{0.2/2} \times \frac{100}{\sqrt{25}}$$

$$C.I = 520 \pm z_{0.1} \times \frac{100}{\sqrt{25}}$$

$$C.I = 520 \pm 0.5398 \times \frac{100}{\sqrt{25}}$$

Lower limit

$$= 520 - 0.5398 \times \frac{100}{\sqrt{25}} \\ = 509.2$$

Higher limit

$$= 520 + 0.5398 \times \frac{100}{\sqrt{25}} \\ = 530.796$$

$[509.2 \leftrightarrow 530.7] \rightarrow$ To accept-

Null hypothesis

520 lies b/w 509.2 \leftrightarrow 530.7

Accept the Null hypothesis

Q3. A car believes that the percentage of citizens in city ABC that own a vehicle is 60% or less. A sales manager disagrees with this. He conducted a hypothesis testing surveying 250 residents & found the 170 residents 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.

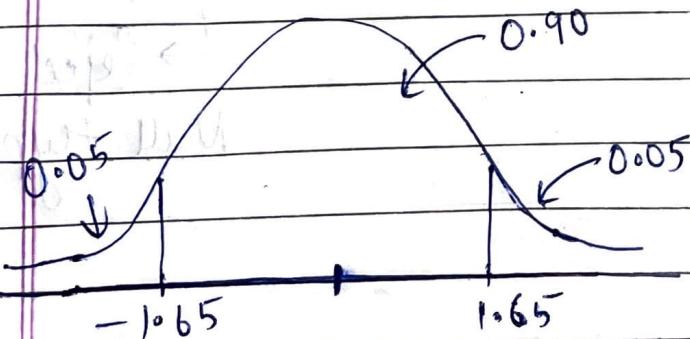
(i) NULL hypothesis : $H_0 : P_0 = 60\%$
 $H_1 : P_0 \neq 60\%$

$$n = 250, x = 170$$

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

$$q_0 = 1 - p_0 = 1 - 0.60 = 0.40$$

$$\alpha = 0.10, C.I = 90\% = 0.90$$



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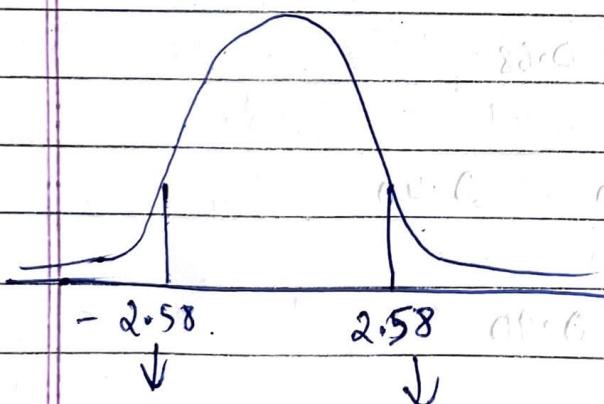
$Z\text{-test} = \frac{\hat{P} - P_0}{\sqrt{\frac{P_0(1-P_0)}{n}}}$

$$= \frac{0.68 - 0.60}{\sqrt{\frac{0.60 \times 0.40}{250}}} = \frac{0.68 - 0.60}{0.03098}$$

$$Z\text{-test} = 2.58$$

$2.58 > 1.65$ Reject Null hypothesis

P-Value -



$$1 - 0.99506 = 0.00494$$

$$P\text{-Value} = 0.00494 + 0.00494 = 0.0098$$

$P\text{-Value} < \alpha$

$$0.0098 < 0.10$$

Reject
Null hypothesis

Q4. What is the value of 99 percentile?

→ { 2, 2, 3, 4, 5, 5, 5, 6, 7, 8, 8, 8, 8, 8, 9, 9, 10, 11, 11, 12 } 

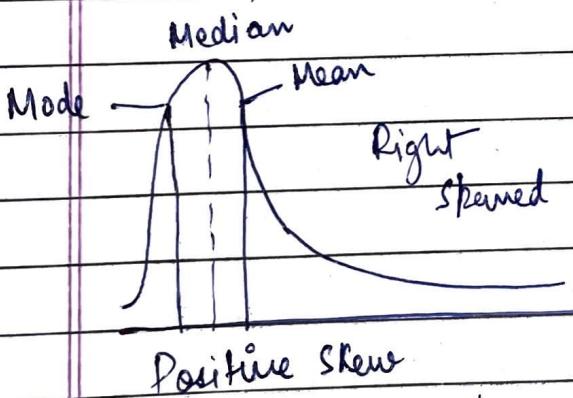
$$\text{Value} = \frac{\text{Percentile}}{100} \times (n+1)$$

$$= \frac{99}{100} \times 21 = 20.79 \rightarrow \text{not present}$$

↓
20th Index

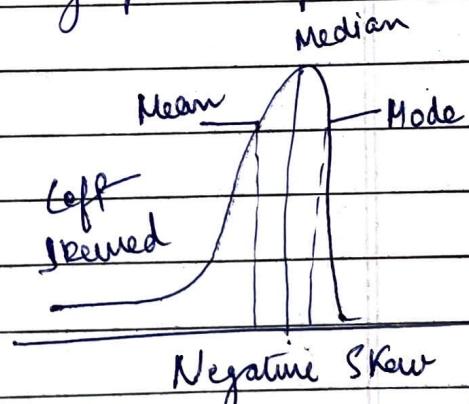
$$20\text{th Index} = 12 = \text{Ans}$$

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



Eg (i) Wealth Distribution
(ii) Length of comments in youtube channel

Relationship : —
 $\text{Mean} > \text{Median} > \text{Mode}$



Eg (i) Life span of human being

Relationship : —
 $\text{Mode} > \text{Median} > \text{Mean}$