

Statistics Assignment

① Plot a histogram

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

Sol?

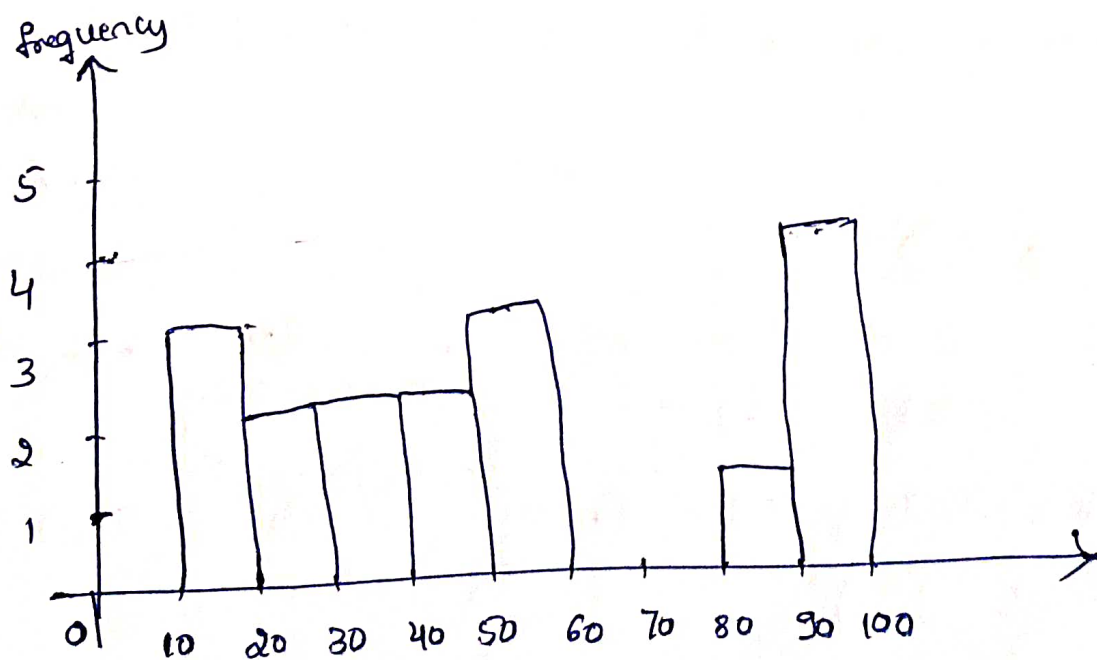
{10, 13, 18, 22, 27, 32, 38, 40, 45, 51, 56,
57, 88, 90, 92, 94, 99}

Numbers are between 0 + 100

Bins = Number of bins = 10

$$\text{Bin size} = \frac{100}{10} = 10$$

∴ The histogram is



② In the quant test of CAT exam the population standard deviation is known to be 100. A sample of 25 test takers has a mean of 520. Construct a 80% CI about mean?

$$\Rightarrow \sigma = 100 \quad n = 25 \quad \bar{x} = 520 \quad C.I = 80\%$$

$$\therefore \alpha = 1 - C.I = 1 - 80\% = 1 - 0.80 = 0.20$$

$$\frac{\alpha}{2} = \frac{0.20}{2} = 0.1$$

$$\therefore 1 - 0.1 = 0.9$$

from z score table value for 0.9 is 1.29

$$\text{Lower fence} = \bar{x} - Z_{\alpha/2} \left(\frac{\sigma}{\sqrt{n}} \right)$$

$$= 520 - 1.29 \left(\frac{100}{\sqrt{25}} \right)$$

$$= 520 - 1.29 \left(\frac{100}{5} \right)$$

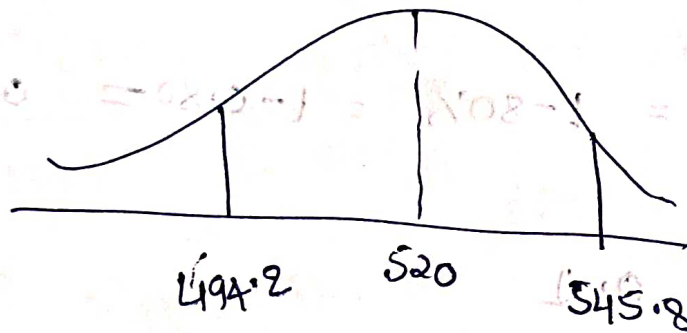
$$= 494.2 //$$

$$\text{Higher fence} = \bar{x} + Z_{\alpha/2} \left(\frac{s}{\sqrt{n}} \right)$$

$$= 520 + 1.29 \left(\frac{100}{\sqrt{25}} \right)$$

$$= 520 + 1.29 \left(\frac{100}{5} \right)$$

$$= 545.8$$



$$\left(\frac{100}{\sqrt{25}} \right) = 20$$

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③ A car believes that the percentage of Citizen in the City ABC that owns a vehicle is 60%. @ less. A sales manager disagrees with this. He conducted a hypothesis testing surveying 250 residents & found that 170 residents responded Yes to owning vehicles.

a) state a 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% @ less

Sol:

a)

Null Hypothesis $H_0 : p_0 \leq 60\% \leq 0.6$

Alternative " $H_1 : p_1 > 60\% > 0.6$

$$n = 250$$

$$x = 170$$

$$\alpha = 10\% = 0.1 \quad CI = 90\%$$

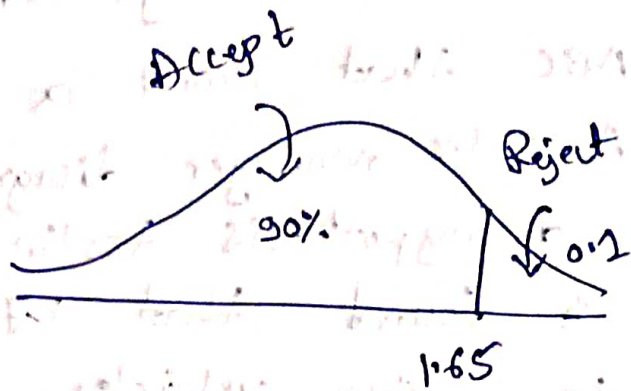
$$\hat{p} = \frac{x}{n} = \frac{170}{250} = 0.68$$

$$p_0 = 0.6$$

$$q_0 = 1 - 0.6 = 0.4$$

$$q_0 = 0.4 //$$

Need to use one tailed test as we are considering value greater, ~~than~~ ~~the~~ So need to use Right sided test



from the z table
the value is 1.65.

$$1 - 0.1 = 0.90$$

Z test with Proportion.

$$Z_{\text{test}} = \frac{\hat{p} - p_0}{\sqrt{\frac{p_0 q_0}{n}}}$$

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

$$= \frac{0.08}{0.030984}$$

$$Z_{\text{test}} = 2.58$$

$$Z_{\text{score}} = 2.58$$

$$P_{\text{value}} = 1 - 0.99506$$

$$P_{\text{value}} = 0.00494$$

∴ from z test $2.58 > 1.65$ and also,

$$P_{\text{value}} 0.00494 < 0.10.$$

Therefore we have to reject the Null Hypothesis

⑤ At the 10% significance level, there is enough evidence to reject the idea that vehicle owner in ABC City is 60% or less.

④ 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:

$$\text{Value of 99 percentile} = \frac{\text{Percentile}}{100} \times n+1$$

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

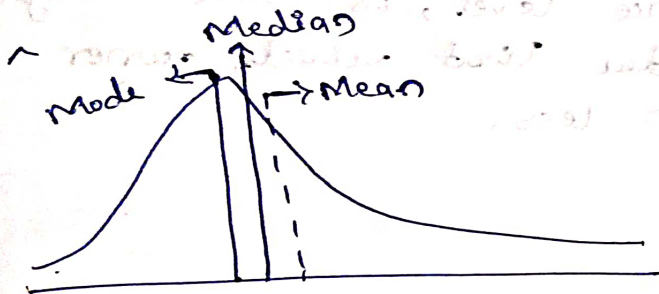
$$= \frac{99}{100} \times 21$$

$$= 20.79 \text{ Index value}$$

∴ The value of the 99 percentile = 12 //

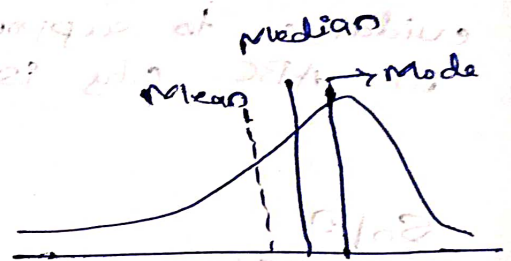
Q In left and Right skewed data, what is the relationship between mean, median & mode? Draw the graph to represent the same.

Solⁿ:



Right skewed data

$\text{Mean} > \text{Median} > \text{Mode}$



Left skewed data

$\text{Mode} > \text{Median} > \text{Mean}$

⇒ Relationship between mean, median & mode is.

⇒ If the distribution of the data is skewed to the right, the mode is often less than the median, which is less than mean.

⇒ If the distribution of the data is skewed to the left, the mean is less than the median, which is often less than mode.