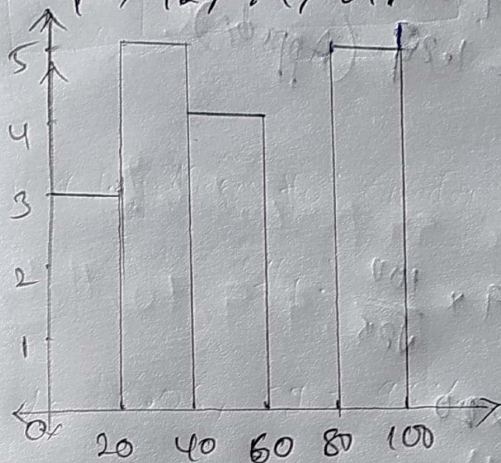


STATISTICS ASSIGNMENT

① Plot a histogram, of Bins 5

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



② In a quant test of 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 Data:

population standard deviation $\sigma = 100$

no. of size of sample $n = 25$

mean of sample $\bar{x} = 520$

CI = 80%

$$\alpha = 1 - 0.8 = 0.2$$

point of Estimation \pm Margin of Error

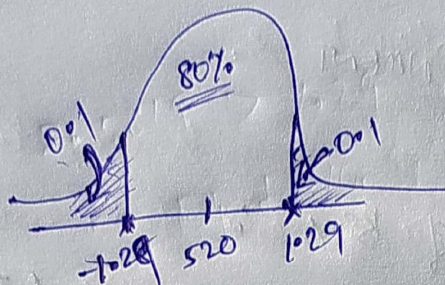
$$\boxed{\bar{x} \pm Z_{\alpha/2} \frac{\sigma}{\sqrt{n}}}$$

$$\alpha = 1 - CI$$

$$= 1 - 0.8$$

$$= 0.2$$

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



from z-table find s.d. for 0.1 & 1-0.1 \Rightarrow 0.9

\Rightarrow for 0.9 \Rightarrow $z = +1.29$ (Approx)

for 0.1 \Rightarrow $z = -1.29$ (Approx)

$$\text{Lower Fence} = \bar{x} - z_{\alpha/2} \frac{s}{\sqrt{n}}$$

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

$$\Rightarrow 520 - 1.29 \times 20$$

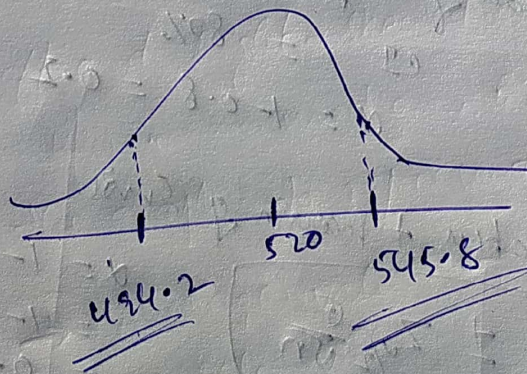
$$\Rightarrow \underline{\underline{494.2}}$$

$$\text{Upper Fence} = \bar{x} + z_{\alpha/2} \frac{s}{\sqrt{n}}$$

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

$$= 520 + (1.29 \times 20)$$

$$= \underline{\underline{545.8}}$$



③ 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 and found that 170 residents responded yes to owning a vehicle.

(a) state Null & alternate Hypothesis

(b) At a 10% significance level, is there enough evidence to support the idea that vehicle owners in ABC city is 60% or less.

Sol: Given Data: $\mu = 60\%$ $n = 250$
 $\% \leq 60\%$ $x = 170$
 $\alpha = 0.1$, $CI = 90\%$

① Null Hypothesis $H_0: p_0 \leq 60\%$

$H_1: p_0 > 60\%$

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

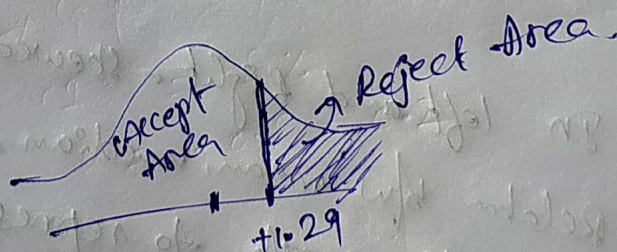
$$p_0 = 60\% \Rightarrow 0.6$$

$$q_0 = 1 - p_0 = 1 - 0.6 = 0.4$$

② $\alpha = 0.1$ $\left\{ \begin{array}{l} \text{Since it is a one-tail test} \\ \text{take } \alpha = 0.1 \end{array} \right\}$

$$1 - 0.01 \Rightarrow 0.9$$

from Z-table.
 S.D. ± 1.29



③ Z-test with proportion:

$$Z_{\text{test}} = \frac{\hat{p} - p_0}{\sqrt{\frac{p_0 q_0}{n}}} = \frac{0.68 - 0.6}{\sqrt{\frac{0.6 \times 0.4}{250}}} = 2.5819$$

$2.5819 > 1.29$
 \therefore Reject the Null Hypothesis.

Conclusion: (2) 10% significance level, there is no enough evidence to support the idea that vehicle owners are 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

Sol:

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

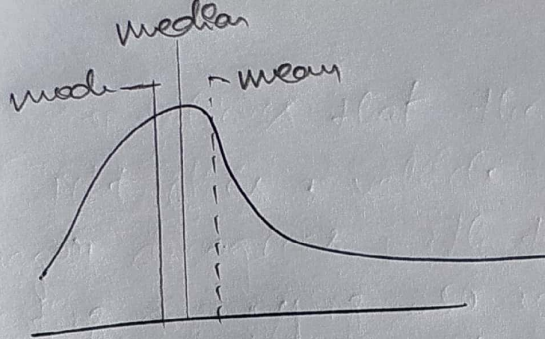
$$= \frac{99}{100} \times 21 \Rightarrow 20.79 \text{ Index}$$

As the Index value crosses the n value
 take the value as 20th index.

i.e. 12

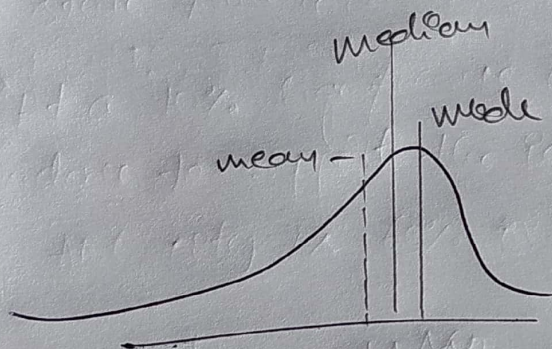
(8) In left and right-skewed data, what is the relation b/w mean, median, & mode?
 Draw the graph to represent the same.

mean \rightarrow Average value
 median \rightarrow middle value
 mode \rightarrow most frequent value.



(right-skewed graph)

$$\text{mean} > \text{median} > \text{mode}$$



(left-skewed graph)

$$\text{mode} > \text{median} > \text{mean}$$

Source: Krish Naik Youtube channel.