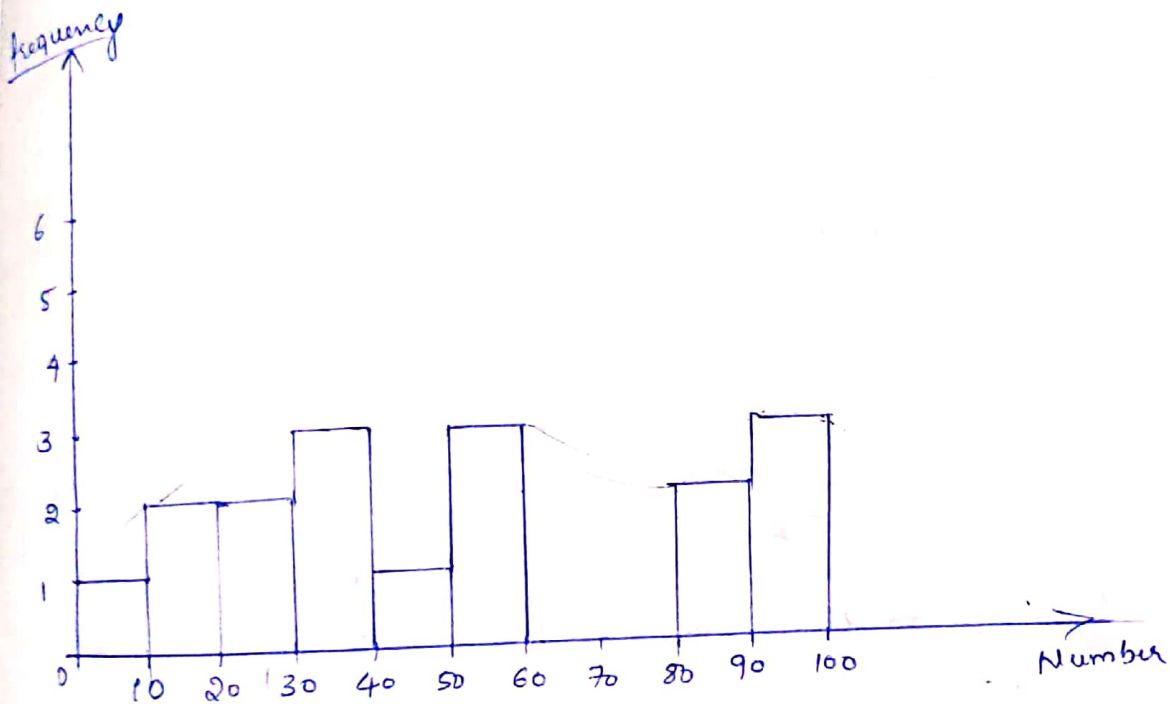Q1) Plot a Histogram.

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

Sol: Bins = 10. Bin size = 10

Q2) 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.
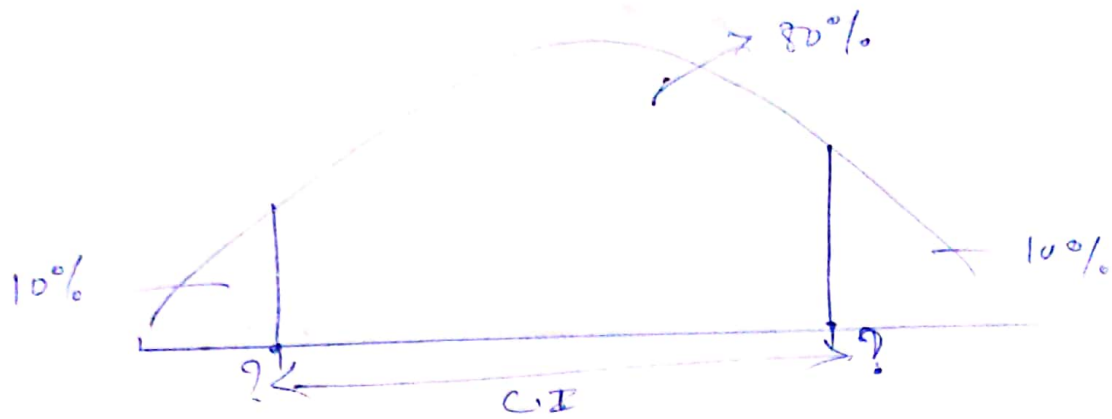
Sol: Population std deviation $\sigma = 100$,

Sample $n = 25$
test.

Sample mean $\bar{x} = 520$

$C.I = 80\%$

$> 80\%$

10%

10%

$?$ $?$

C.I

$$C.I = \text{point estimate} \pm \text{margin of error}$$

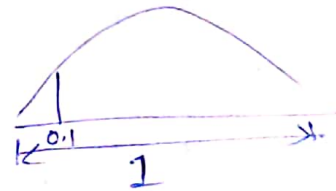$$= \bar{x} \pm Z_{\alpha/2} \frac{\sigma}{\sqrt{n}}.$$

$$\alpha = \text{Significane value} = 1 - C.I$$

$$\alpha = 1 - 0.8$$

$$\boxed{\alpha = 0.2}$$

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

from Z-table $\Rightarrow$ $Z_{0.1}$

$$\boxed{Z_{0.9} = 1.29} \quad \begin{array}{l}(0.899 \; \text{or} \; 0.9), \\ (0.9014 = 0.9)\end{array}$$

$$\text{lower fene} = \bar{x} - Z_{\alpha/2} \frac{\sigma}{\sqrt{n}}$$

$$= 520 - (1.29)\left(\frac{100}{\sqrt{25}}\right)$$
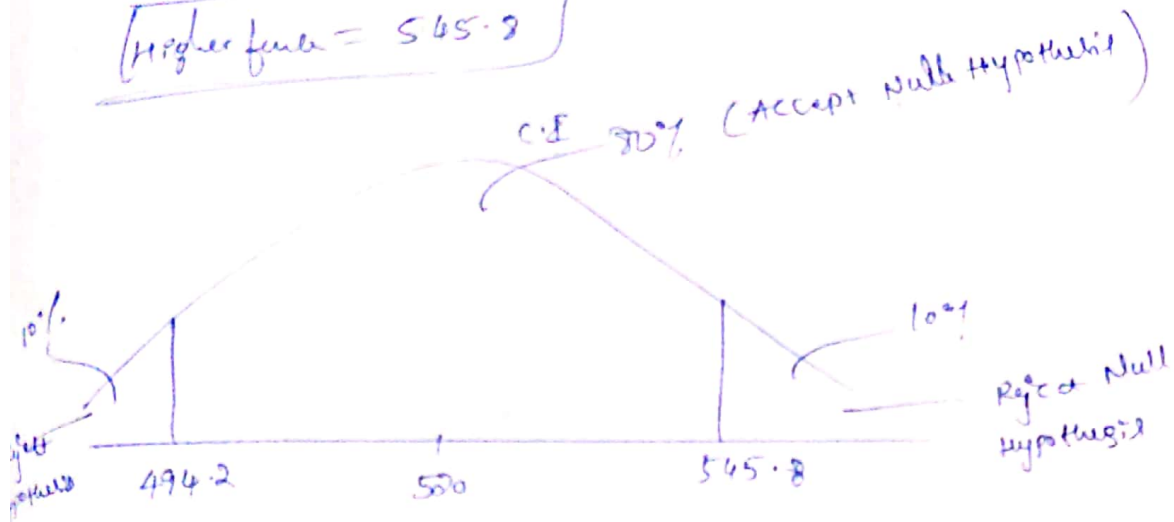
$$= 520 - (1.29)(20)$$

$$= 520 - 25.8$$

$$\boxed{\text{lower force} = \$\,494.2}$$

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

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

$$= 520 + 25.8$$

$$\boxed{\text{Higher fence} = 545.8}$$

C.I 80% (Accept Null Hypothesis)

494.2   520   545.8

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

Sol⁻ $n = 20.$

99th Percentile $\Rightarrow \frac{99}{100} \times (n+1)$

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

$$\frac{99}{100}(21)$$

$$\Rightarrow 20.79 \text{ —Index}$$

$$\boxed{99^{th} \text{ Percentile} = 12}$$

Q3) A car believes that the percentage of citizens in the city ABC. that owns a vehicle is 60% (or) less.

A Sale manager disagrees with this. the conducted a Hypothesis testing Surveying 250 residents & found that 170 residents responded to yes to owing a vehicle

(a) State the null & alternate Hypothesis

(b) At a 10% Significance level, is there enough evidence to support the idea that vehicle owns in ABC city is 60% (or) less.
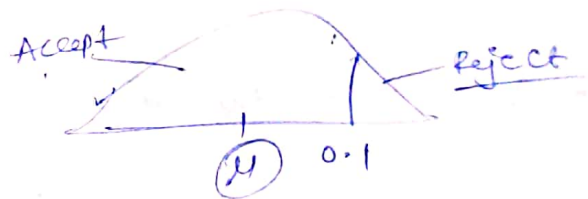
Sol: Step ①

$H_0 \rightarrow P_0 \leq 60$ $\qquad n = 250$

$H_1 \rightarrow P_b > 60$ $\qquad x = 170$

$$\hat{P} = \frac{x}{n} = \frac{170}{250} = 0.68 \qquad \boxed{\alpha = 0.1}$$

$$\boxed{\hat{P} = 0.68}$$

Accept / Reject

μ $\qquad$ 0.1

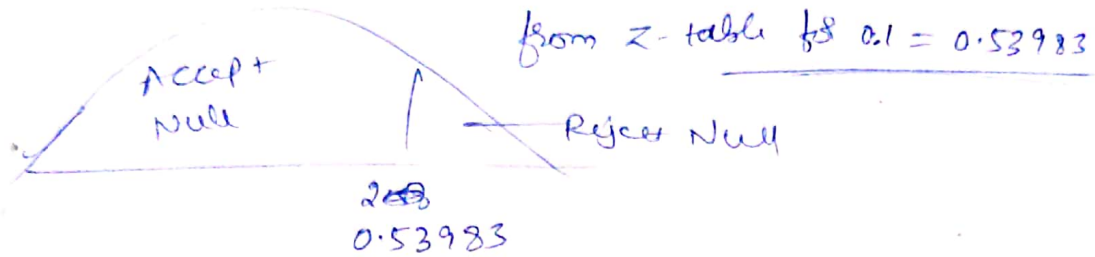$P_0 = 60 = 0.6 \qquad q_0 = 1 - P_0$

$$q_0 = 1 - 0.6$$

$$\boxed{q_0 = 0.4}$$

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

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

$$= \frac{0.68 - 0.6}{\sqrt{\frac{0.6 \times 0.4}{256}}} = \frac{0.08}{0.0309}$$
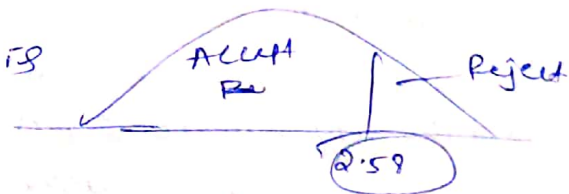
$$\boxed{Z\text{-test} = 2.59}$$

from z-table for $0.1 = 0.53983$

Accept Null | Reject Null

$2 \oplus$
0.53983

$\therefore Z\text{-test} = 2.58 > 0.5398$

$\therefore$ Reject Null Hypothesis

P- values

from z-table for 2.58 is

0.99506

Accept Re | Reject

$\boxed{2.59}$

$\therefore 1 - 0.99506 = 0.00494$

$$\boxed{P\text{-value} = 0.00494 < \text{Significance value} = 0.1}$$
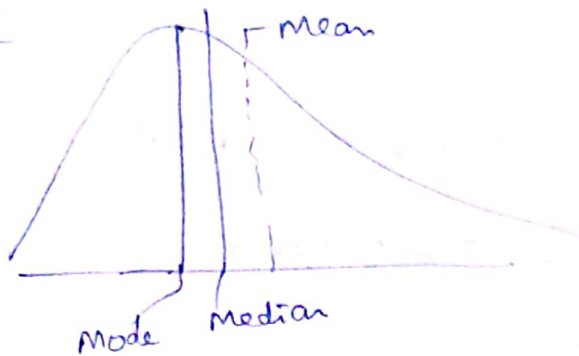
Reject Null Hypothesis

$\therefore$ Sales manager is correct, the city owns vehicle more than 60%

(5) In left & Right-skewed data, what is the relationship between mean, median & mode?

Draw a graph to represent the same

Sol

mean

Mode   Median

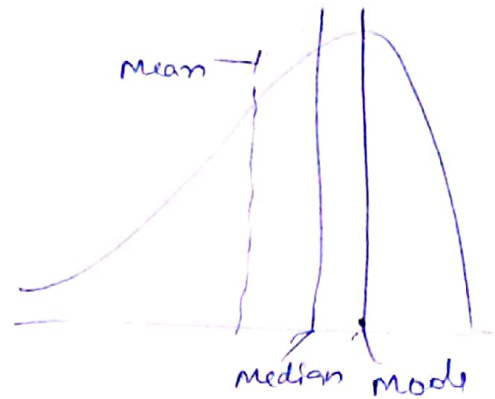Right Skewed
(+ve)
Mode < median < mean

Ex: pet distribution

it is a right skewed because, maximum households in the city have 1 or 2 pets

but there will be outliers where households will have

10, 11, 15 ≠

Mean

Median   mode

Left Skewed
(-ve)
mean < median < mode.

Ex: Age of retirement,
most of the people will retire at the age of 50-60

where
where as the retirement below 40 are very less comparitively