Q.1: Plot a histogram,

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

No. of Bins = 5

Bin Size = 20

Range	frequency
0 - 20	3
20 - 40	4
40 - 60	5
60 - 80	0
80 - 100	5

Histogram :
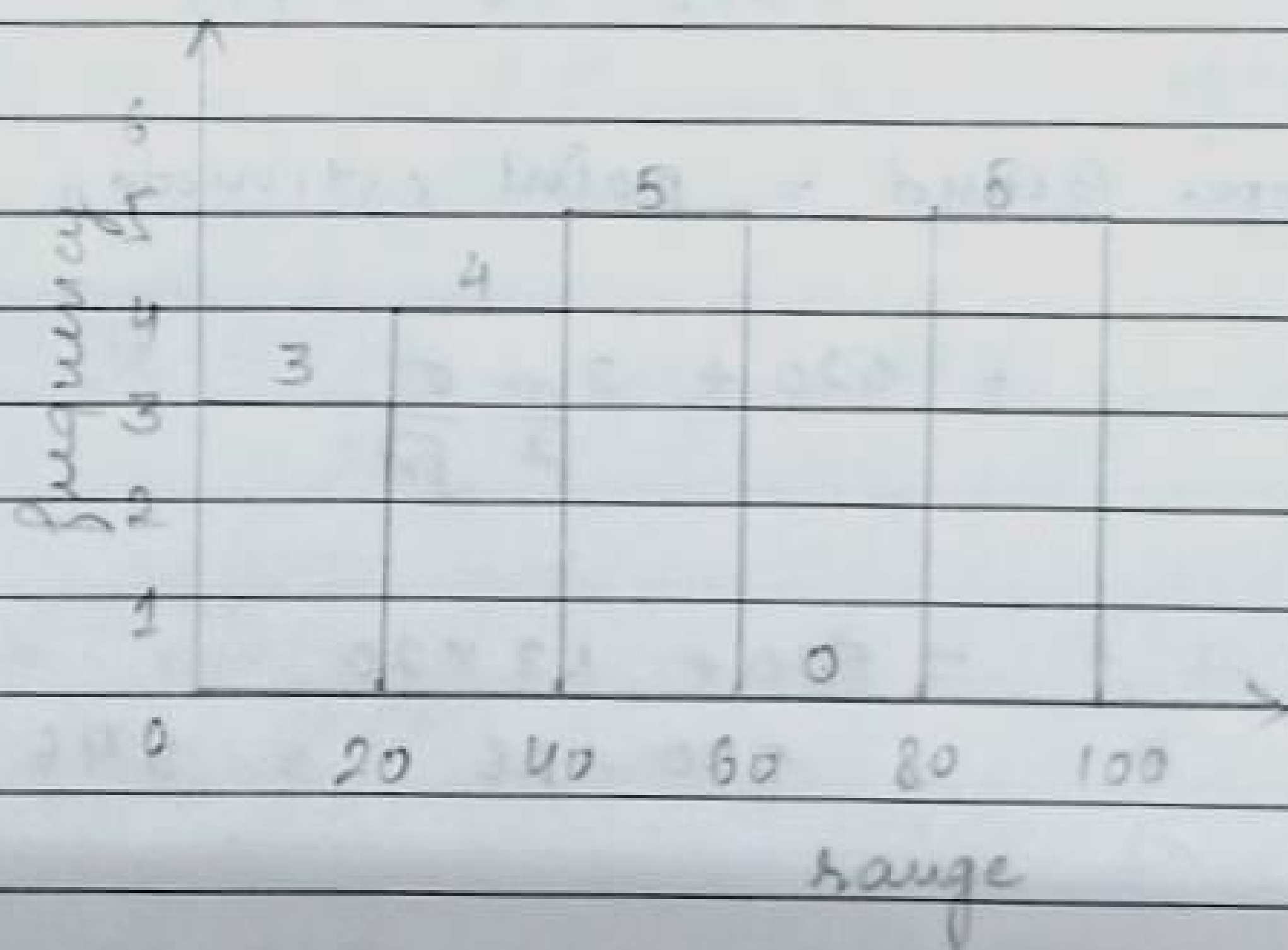
Q2: In a quant test of CAT exam, the population standard deviation is known to be 100. A sample of 25 tests taken has a mean of 520. Construct an 80% CI about the mean

Given $\sigma = 100$ $CI = 80\% = 0.80$

$n = 25$ $\alpha = 1 - CI$

$\bar{x} = 520$ $\Rightarrow \alpha = 0.20$

lower Bound = point estimate − Margin of error

$$= 520 - Z_{\frac{\alpha}{2}} \frac{\sigma}{\sqrt{n}}$$

$$= 520 - Z_{0.10} \times \frac{100}{5}$$

$$= 520 - 1.3 \times 20$$

$$= 520 - 26 = 494$$
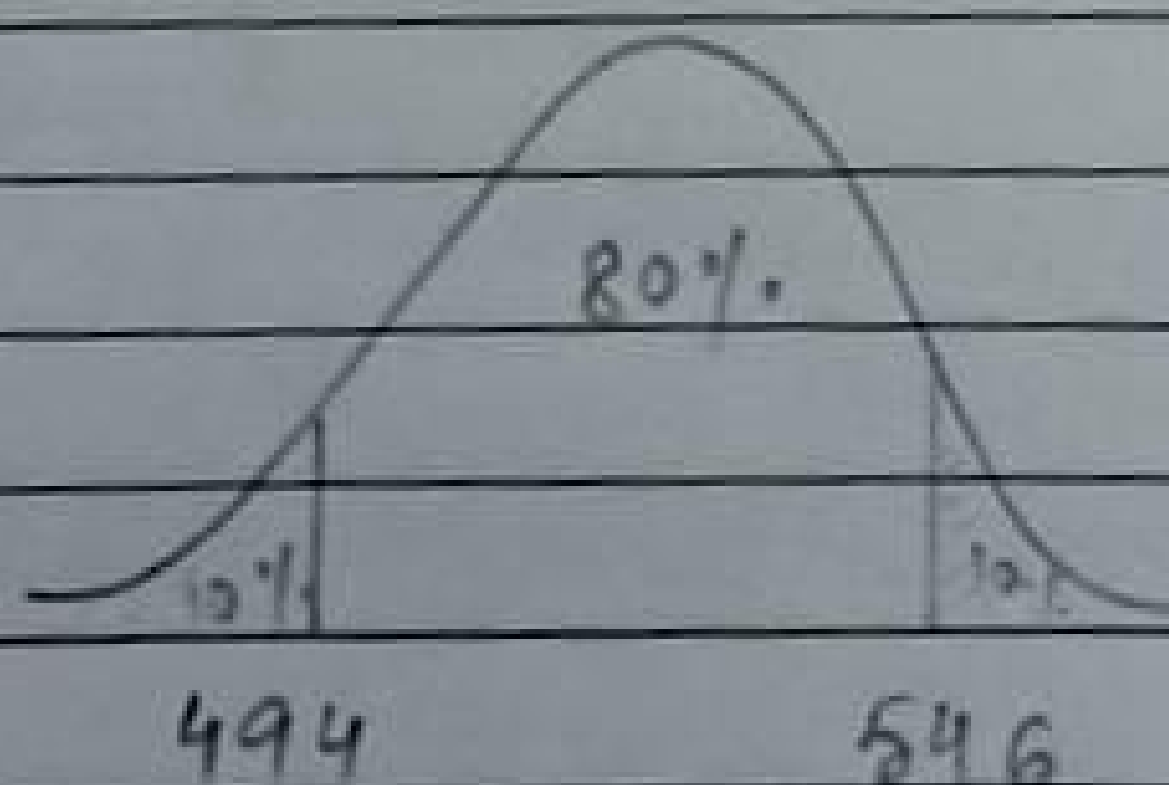
upper Bound = point estimate + margin of error

$$= 520 + Z_{\frac{\alpha}{2}} \frac{\sigma}{\sqrt{n}}$$

$$= 520 + 1.3 \times 20$$

$$= 520 + 26 = 546$$

80%

10%   10%

494   546

Q3:-

(a) State Null and Alternate Hypethesis

H_0: vehicle owner~~ship~~ is 60% or less
                    (ship) (not)
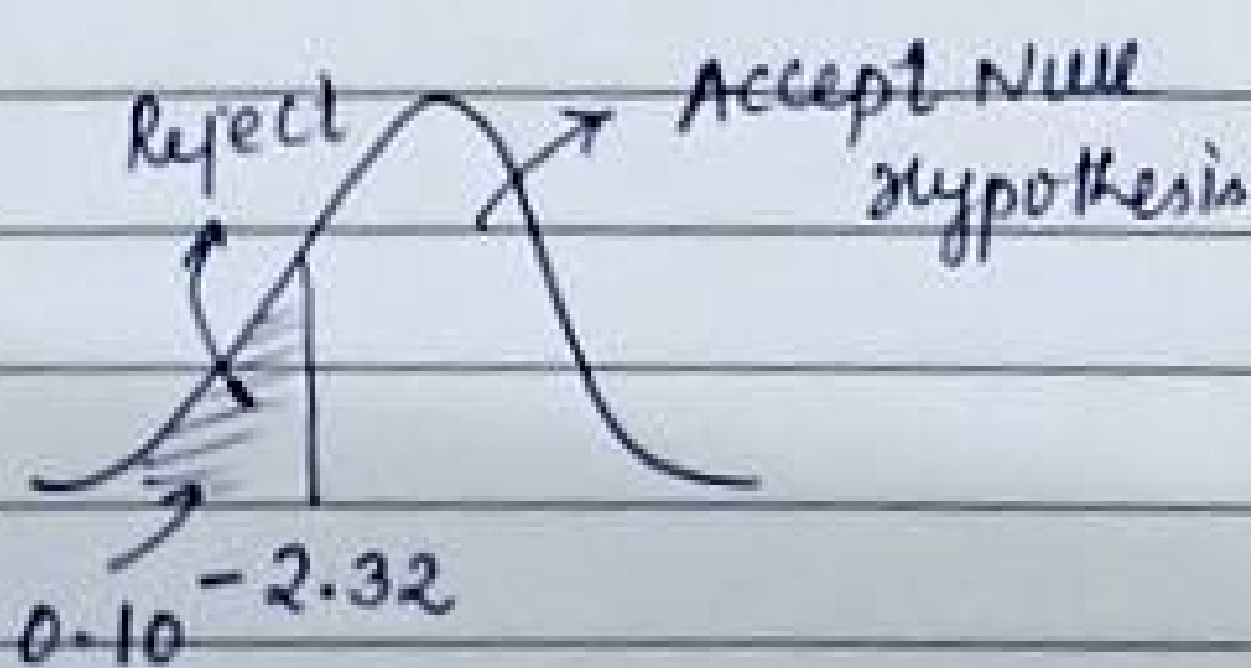
H_1: vehicle ownership is ~~not~~ 60% or less

(b) At 10% significance level, is there enough evidence to support the idea that vehicle ownership is 60% or less

$\alpha = 0.10$, $n = 250$

proportion that owns a vehicle $= \dfrac{170}{250} = 0.68$

$$\hat{p} = 0.68$$

$P_0 = 0.60$, $q = 1 - 0.60 = 0.40$

Reject ← → Accept Null Hypothesis

0.10 −2.32

$$Z = \dfrac{\hat{p} - p_0}{\sqrt{\dfrac{p_0 q_0}{n}}}$$

$$Z = \dfrac{0.68 - 0.60}{\sqrt{\dfrac{(0.6)(0.4)}{250}}} = \dfrac{0.08 \times 5 \times \sqrt{10}}{\sqrt{0.24}}$$

$$Z = 2.5 > -2.32$$

$\Rightarrow$ Null Hypothesis holds true

$\therefore$ vehicle ownership is ~~v~~ 60% or less
                              (not)

Q4: What is the value of 99 percentile?

data: 2, 2, 3, 4, 5, 5, 6, 7, 8, 8, 8, 8, 8, 9, 9, 10, 11, 11, 12

Using $n = \dfrac{P}{100} \times N+1$

$$= \frac{99}{100} \times 20 = 19.8$$

$$n = 12$$

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

In right skewed data, the mean is always greater than the median. The reason is that the large value of the outliers present on the right. These outliers affects the mean to large extent while median is not affected by these outliers.

Mode, Median

median
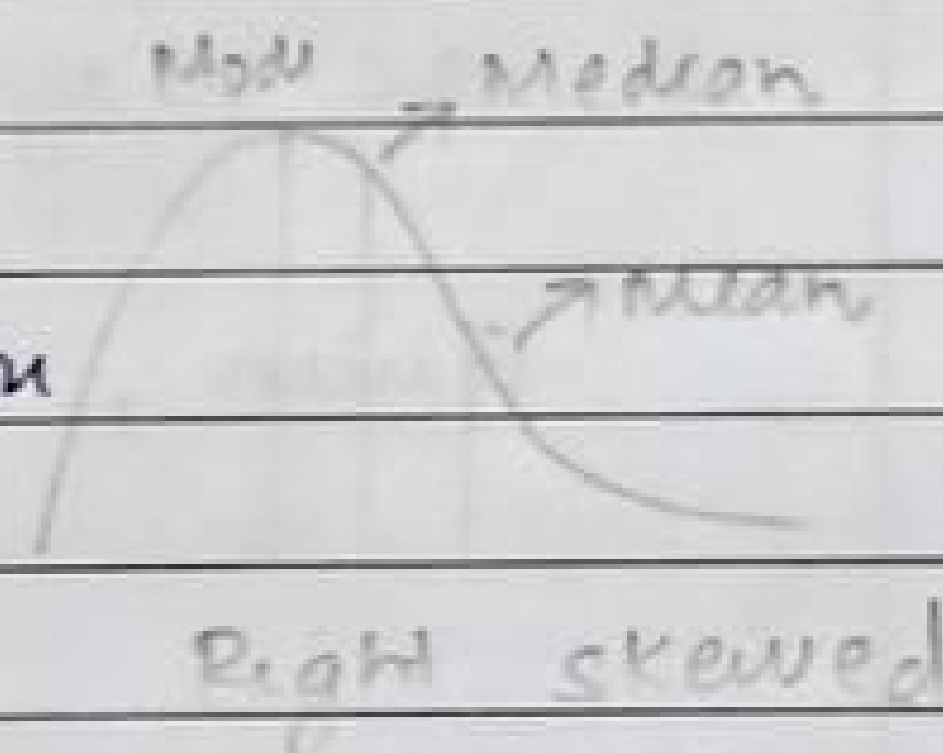
Right skewed

On the other hand, in left screwed data, the mean is always lesser than the median because of the larger values present on the left.

Median, Mode

Mean

left skewed : Mean < Median < Mode

Right skewed : Mean > Median > Mode

left skewed