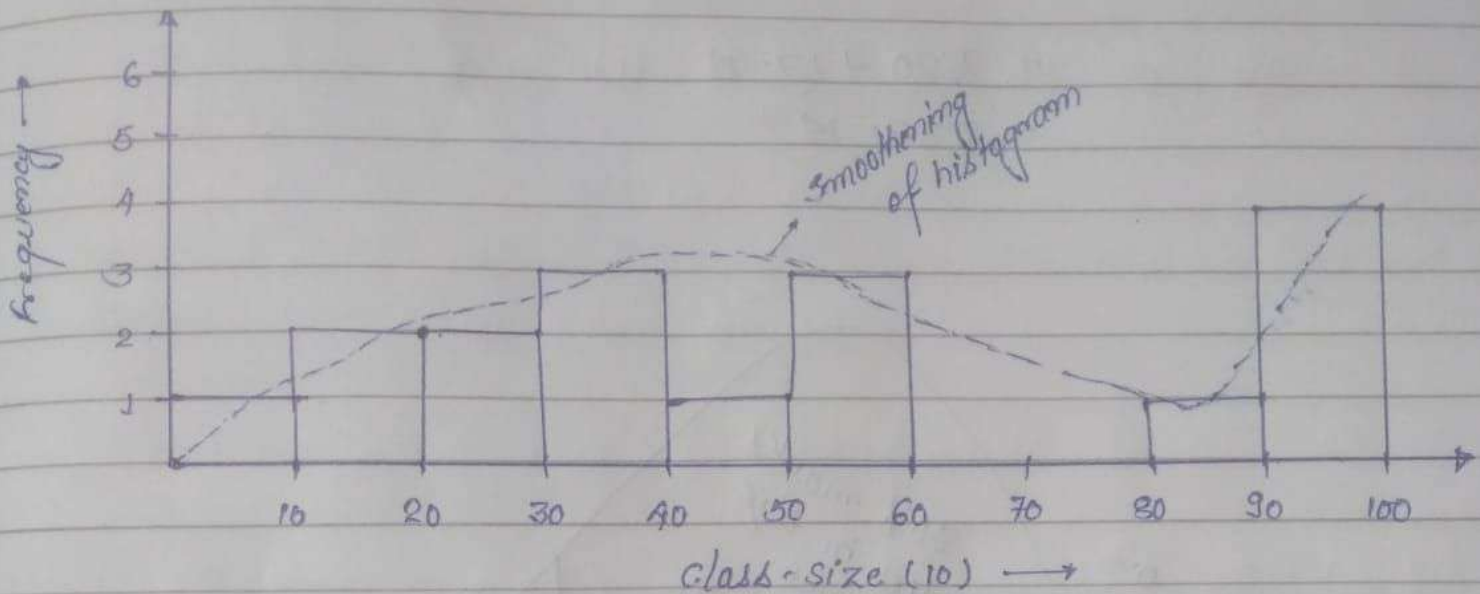


Assignment-1

1. Ques) Plot a histogram.

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



$$\text{mean} = \frac{872}{17} = 51.29$$

2. Ques) In a quant test of the CAT exam, the population standard deviation is known as 100. A sample of 25 tests taken has a mean of 520. construct an 80% CI about the mean.

$$\text{Given, } \sigma = 100, \quad n = 25, \quad \bar{x} = 520, \quad CI = 0.80$$

$$\alpha = 1 - 0.8 = 0.2, \quad \text{dof} = 24$$

here, $n = 25$, less than 30, so we use t-test.

let us assume it, to be one tail test

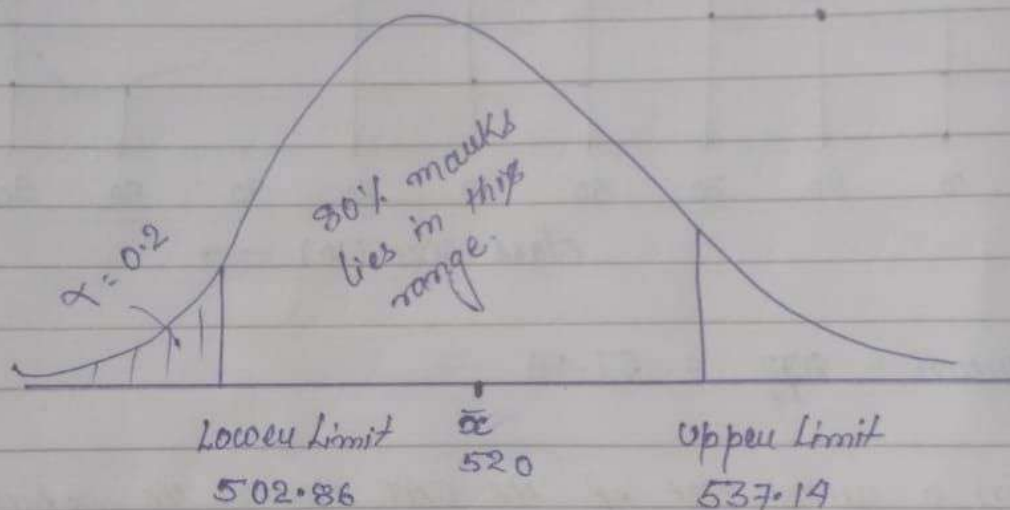
$$\text{Lower Limit} = \bar{x} - t_{\alpha} * \frac{\sigma}{\sqrt{n}}$$

$$= 520 - 0.857 * \frac{100}{\sqrt{25}}$$

$$= 520 - 17.14$$

$$= 502.86$$

$$\begin{aligned}
 \text{Upper Limit} &= \bar{x} + t_{\alpha} \times \frac{s}{\sqrt{n}} \\
 &= 520 + 0.857 \times \frac{100}{\sqrt{25}} \\
 &= 520 + 17.14 \\
 &= 537.14
 \end{aligned}$$

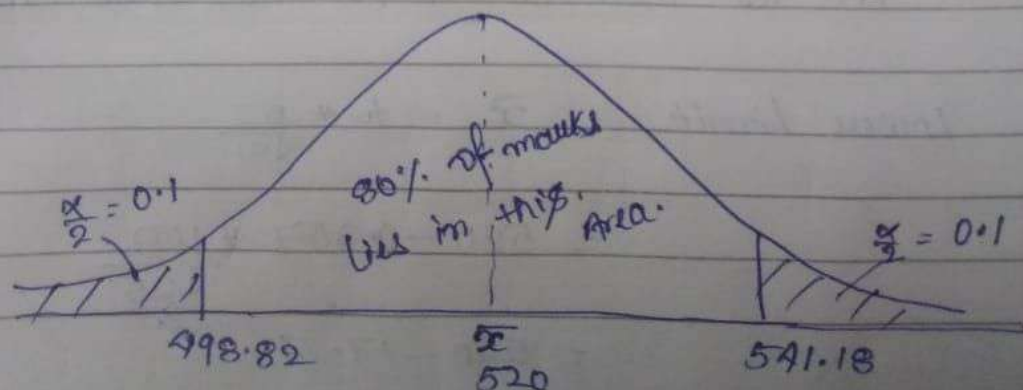


if we take it, as two tailed test

$$\text{then, Lower Limit} = \bar{x} - t_{\frac{\alpha}{2}} \times \frac{s}{\sqrt{n}} = 520 - 1.059 \times \frac{100}{\sqrt{25}}$$

$$= 520 - 21.18 = 498.82$$

$$\text{Upper Limit} = \bar{x} + t_{\frac{\alpha}{2}} \times \frac{s}{\sqrt{n}} = 520 + 21.18 = 541.18$$



3. (Ans) A car company believes that the % of citizens in the city ABC that owns a vehicle is 60% or less. A ~~statistic~~ sales manager disagrees with this. He conducted a hypothesis testing surveying 250 residents and found 170 residents responded yes to owning a vehicle.

- state the Null & alternate hypothesis.
- At a 10% significance level, is there enough evidence to support the idea that vehicle owners in ABC city is less 60% or less.

Null hypothesis $\rightarrow H_0 \rightarrow \mu_0 \leq 60\% = P = 0.6$, $q = 0.4$
 Alternate hypothesis $\rightarrow H_1 \rightarrow \mu_1 \neq 60\%$

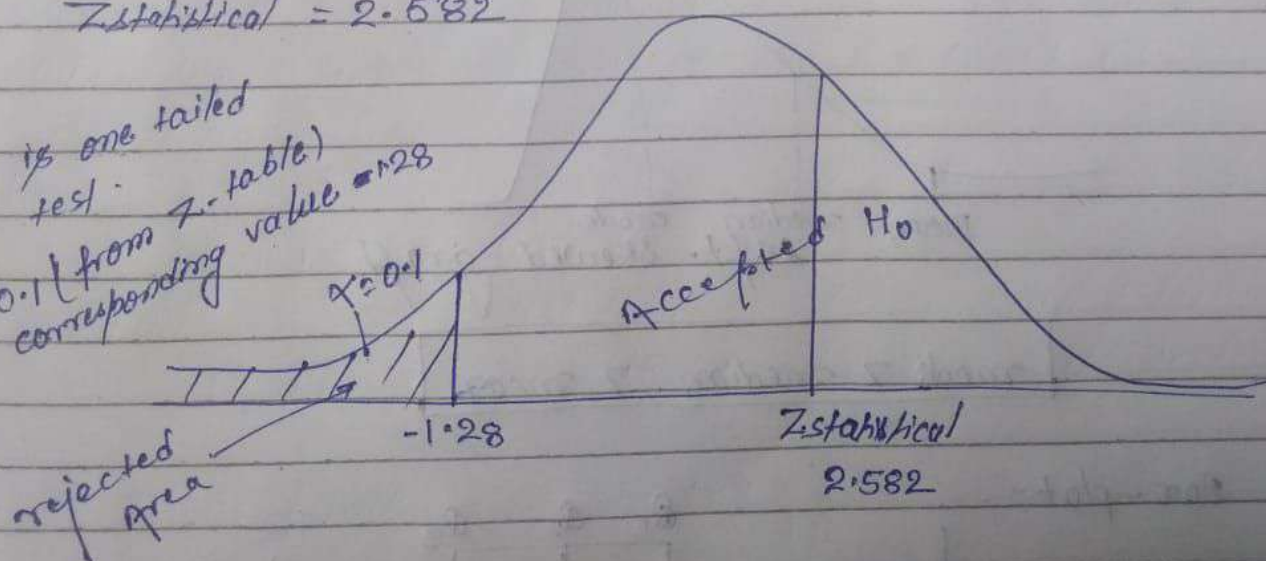
$n = 250$, 170 responded yes
 \rightarrow

$\therefore P_0 = \text{fraction of responded yes} = \frac{170}{250} = 0.68$

$$Z_{\text{statistical}} = \frac{P_0 - P}{\sqrt{\frac{Pq}{n}}} = \frac{0.68 - 0.6}{\sqrt{\frac{0.6 \times 0.4}{250}}} = 0.08 * \sqrt{\frac{250}{0.6 \times 0.4}}$$

$$Z_{\text{statistical}} = 2.582$$

This is one tailed test.
 $\alpha = 0.1$ (from Z-table)
 corresponding value = 1.28



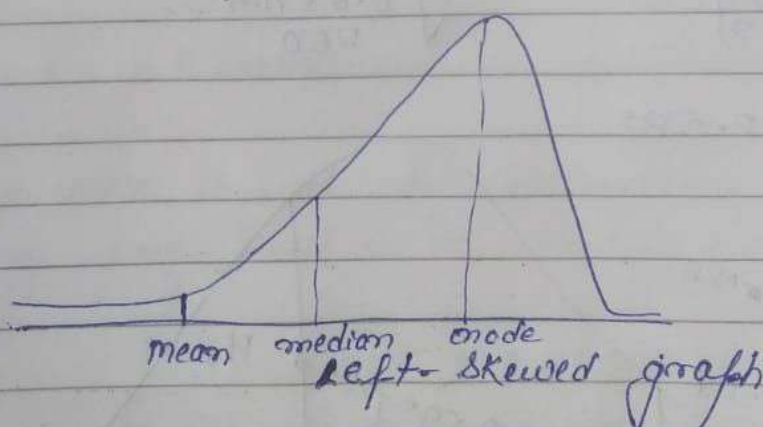
So, Null hypothesis is accepted and hence enough evidence that vehicle owners in ABC city is less than 60% or less.

Ques 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.

$$\begin{aligned} 99 \text{ percentile} &= \frac{99}{100} (n+1) \text{, index value} \\ &= \frac{99}{100} \times 21 \\ &= 20.79 \text{ index value} \end{aligned}$$

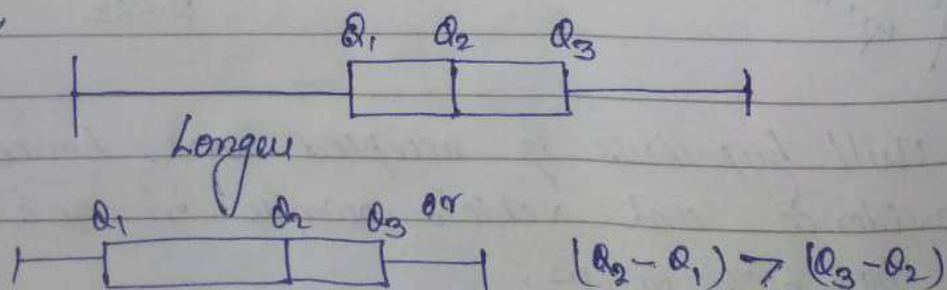
So, 12 is 99 percentile of data given.

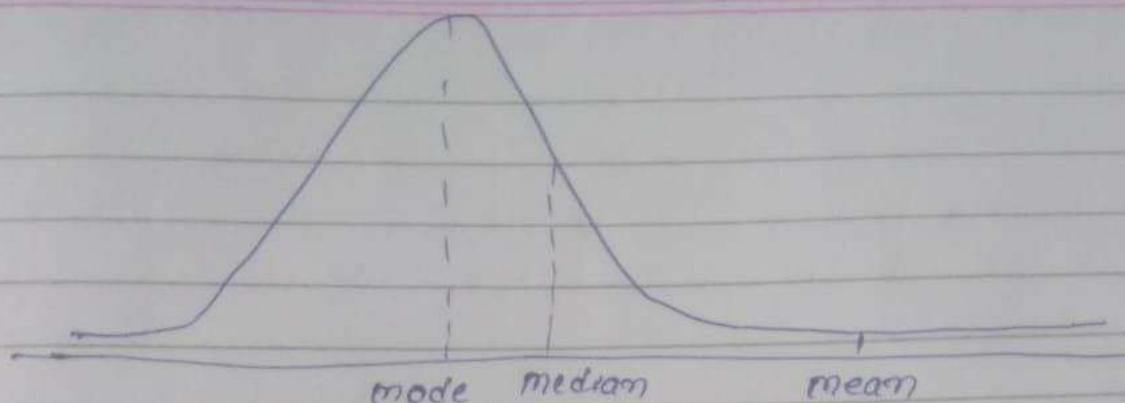
5. Ques) In Left and Right-skewed data, what is the relationship between mean, median and mode?
 Draw the graph to represent the same.



mode > median > mean

Box-plot

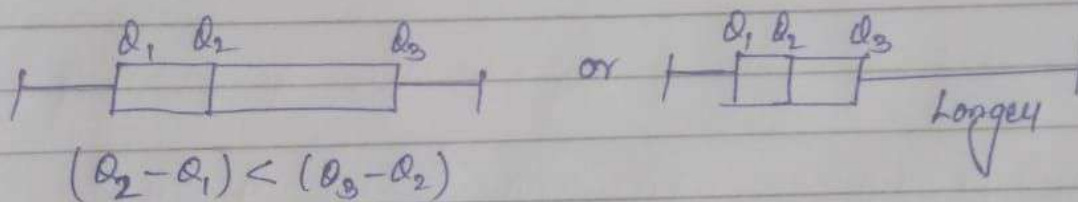




Right-skewed graph \rightarrow

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

Box-plot



In general, for both

$$\boxed{\text{mode} = 3\text{median} - 2\text{mean}}$$