

Que 1) Plot a histogram,

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

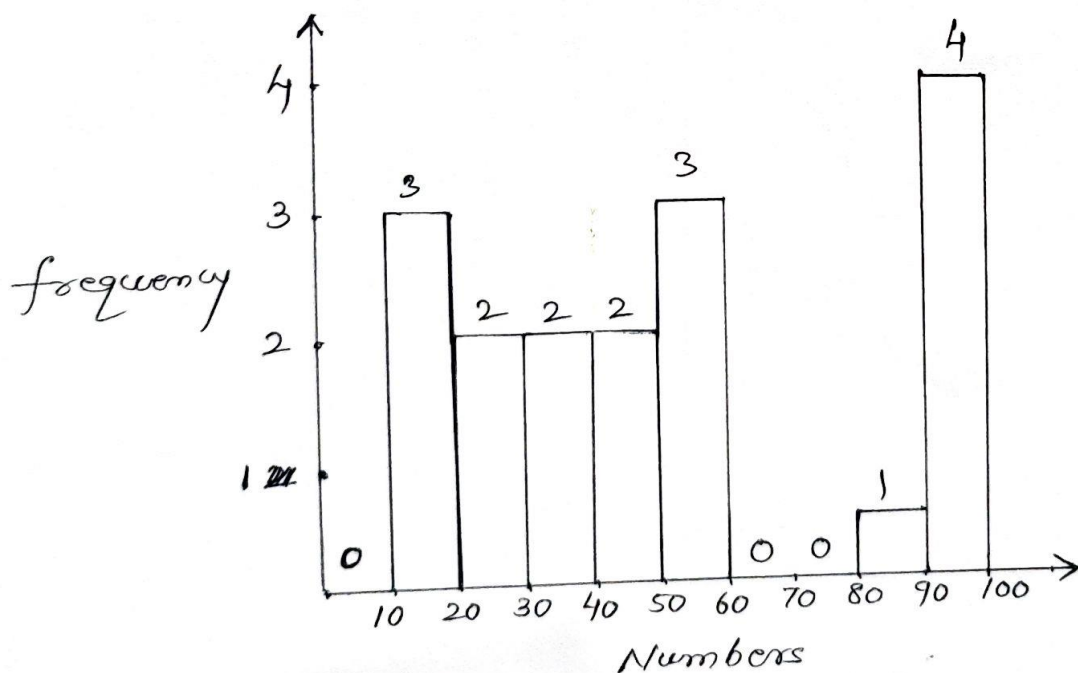
Q1)

Let, Bin size = 10

Number of bins =  $\frac{100}{10} = 10$  ↙ I have taken 100 because 99 is the largest number in the given list.

∴ Bins  $\Rightarrow$  0-10 ; 10-20; 20-30; -----; 90-100

Bins	Numbers	frequency
0-10	No Numbers	0
10-20	10, 13, 18	3
20-30	22, 27	2
30-40	32, 38	2
40-50	40, 45	2
50-60	51, 56, 57	3
60-70	No Number	0
70-80	No Number	0
80-90	88	1
90-100	90, 92, 94, 99	4



Que 2) 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.

Q2) Given:-

Population standard deviation =  $\sigma = 100$

Sample size =  $n = 25$

Sample mean =  $\bar{x} = 520$

Confidence Interval =  $80\% = 0.8$   
(C.I)

Solution:-

$\therefore$  the population standard deviation is given,  
we'll use the Z-table

also;

Mean = point estimate  $\pm$  Margin of error

Here;

point estimate =  $\bar{x} = 520$

Margin of error =  $Z_{\alpha/2} * \frac{\sigma}{\sqrt{n}}$

$$\alpha = 1 - C.I$$

$$= 1 - 0.8$$

$$\alpha = 0.2$$

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

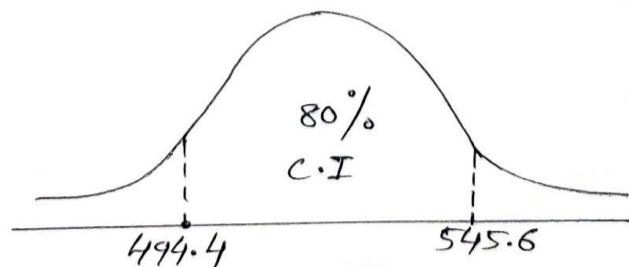
$$Z_{\frac{\alpha}{2}} = Z_{0.1} = 1.28 \text{ from Z-table}$$

$$\therefore \text{Mean} = \bar{x} + Z_{\frac{\alpha}{2}} * \frac{\sigma}{\sqrt{n}} = 520 + 1.28 * \frac{100}{\sqrt{25}}$$

$$\text{Mean} = 545.6$$

OR

$$\begin{aligned} \text{Mean} &= 520 - 1.28 * \frac{100}{\sqrt{25}} \\ &= 494.4 \end{aligned}$$



Que 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 & found that 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 owner in ABC city is 60% or less.

Q3) Null Hypothesis: percentage of citizens that owns a vehicle is 60% or less

$$H_0: p_0 \leq 60\%$$

$$H_a: p_0 > 60\%$$

As percentage is given, we will use proportion method to solve the problem.

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

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

$$p_0 = 60\% = 0.6 \text{ given}$$

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

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

$$Z = 2.582 \Rightarrow \text{calculated value}$$

Now, let's find the value of Z from graph or Z-table.

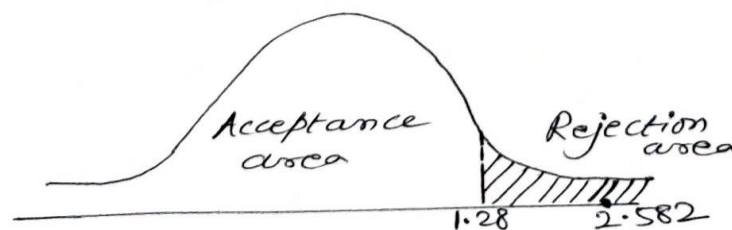
$$\therefore \text{Significance level} = 10\% = 0.1$$

$$\text{for } \alpha = 0.1$$

$$Z = 1.28 \text{ from Z-table}$$

$$\therefore Z(\text{calculated}) > Z(\text{from table})$$

we will reject the Null Hypothesis.  
There is not enough evidence to support the idea that vehicle owners in city ABC is 60% or less.



Que 4) What is the value of the 99 percentile?

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

Q4) Total number of terms given =  $n = 20$   
99 percentile value =  $\left[ \frac{99}{100} * (n+1) \right]^{\text{th}}$  Observation  
 $= \left[ \frac{99}{100} * (20+1) \right]^{\text{th}}$  Observation  
 $= 20.79^{\text{th}}$  Observation

as there are 20 observations  
so the 99 percentile value will be the last observation  
which is 12

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

Draw the graph to represent the same.

