

Q.1: Plot a Histogram

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

Ans:

→ Bin size = 20

→ Total no of Bins = 5

→ Between 0 to 20, Number of elements = 03

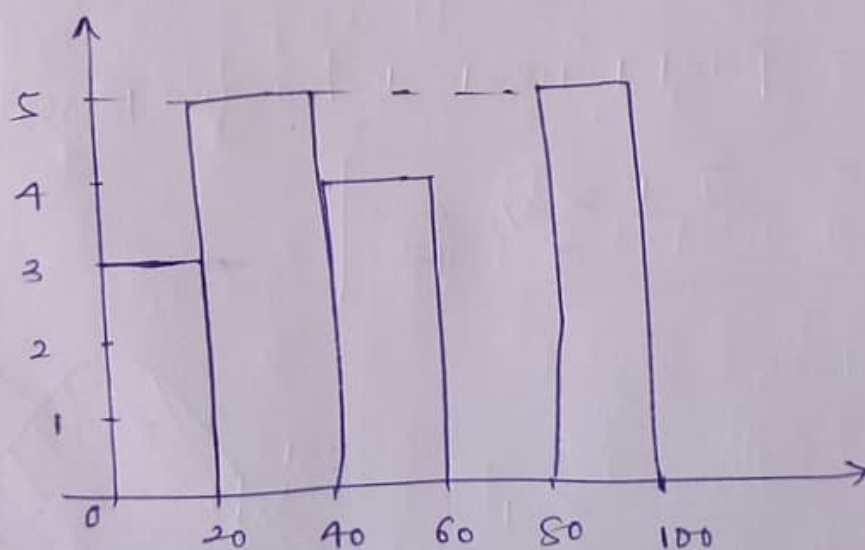
" 20 to 40, " " " = 05

" 40 to 60 " " " = 04

" 60 to 80 " " " = 00

" 80 to 100 " " " = 05

Count of  
Numbers



Bin size = 20

Que: 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.

Ans:

→ Given Data

$$\sigma = 100 \text{ (Population S.D.)}$$

$$n = 25$$

$$\bar{x} = 520$$

$$CI = 80\%$$

Construct 80% CI about the mean?

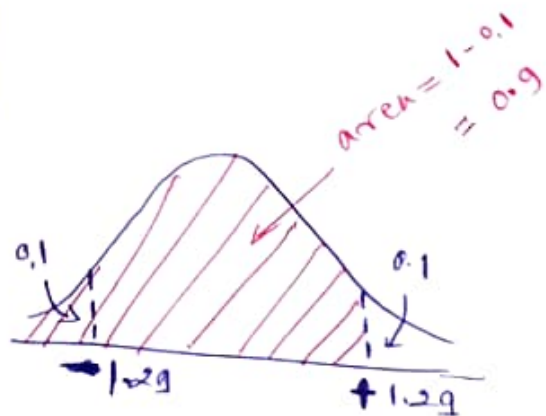
→ Since population standard deviation is given, ~~the~~ Z-test will be used.

→  $CI = \text{Point Estimate} \pm \text{Margin Error}$

$$CI = \bar{x} \pm z_{\alpha/2} \frac{\sigma}{\sqrt{n}}$$

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

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



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

$$= 520 \pm 25.8$$

$$CI = 545.8, 494.2$$

$$\text{Lower limit} = 494.2$$

$$\text{Upper limit} = 545.8$$

Ans

Que. 03: A car believes that the percentage of citizens in city ABC that own the 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.

- (a) State a Null & Alternate Hypothesis.
- (b) At a 10% significant value, Is there enough evidence to support the idea that vehicle owner in ABC city is 60% or less.

Ans:

→ Given data

$$P_0 = 60\% \text{ or } 0.6, \quad n = 250, \quad \hat{p} = \frac{170}{250} = 0.68$$

$$\alpha = 0.10$$

→ Since, Question is asked for 60% or less, One tail test will be conducted.

→ Since ~~Pop~~ sample size  $\geq 30$  i.e 250, Z-test will be used.

→ Step: 01: Nul & Alternate Hypothesis

$$H_0 \Rightarrow P_0 \leq 0.6$$

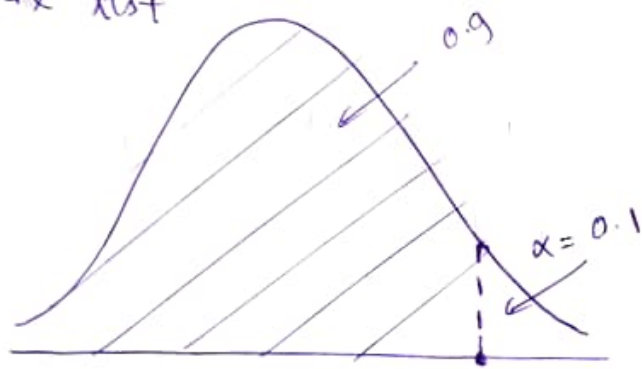
$$H_1 \Rightarrow P_0 > 0.6$$

→ Step: 02 Significant level

$$\alpha = 0.10, \text{ CI} = 90\%$$

→ Step: 03 Decision Boundary

One Tail test



1.29 → from Z Table

If  $Z_{\text{test}} < 1.29 \rightarrow H_0$  will be accepted

If  $Z_{\text{test}} > 1.29 \rightarrow H_0$  will be rejected

→ Step: 04 Calculation of Z-statistics

$$Z_{\text{test}} = \frac{\hat{P} - P_0}{\sqrt{\frac{P_0(1-P_0)}{n}}} = \frac{0.68 - 0.6}{\sqrt{\frac{0.6(1-0.6)}{250}}} = 2.58198$$

$$Z_{\text{test}} = 2.58198$$



## → Step: 05 Conclusion

- Since  $z_{\text{test}} > 1.29$
- Null Hypothesis will be reject & Alternate hypothesis will be accepted.

- Conclusion: Sales manager intuition is correct, i.e. percentage of citizens owning a car is greater than 60% in city ABC.

Que. 04: 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

Ans:

$$\text{Index of Value at } x \text{ percentile} = \frac{x}{100} (n+1)$$

$$= \frac{99}{100} (20+1) = \frac{99 \times 21}{100} = 20.79$$

$$\text{Index of } 99\% = 20.79 \approx 21$$

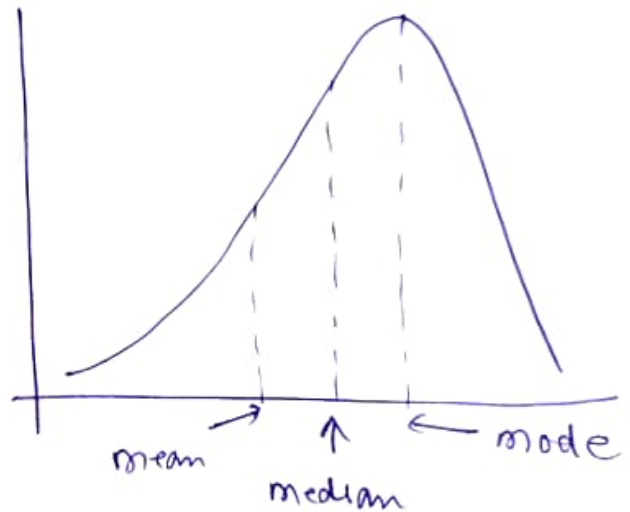
$$\text{Value of } 99\% = 12$$

Que. 05: In the left & right skewed data, what is the relationship between mean, median & mode? Draw the graph to represent the same.

Ans: Left Skewed data

→  $\text{mean} < \text{median} < \text{mode}$

→ Left skewed distribution has a long left tail.



Right Skewed data

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

→ Right skewed distribution has a long right tail.

