

Question 1

Plot a histogram,

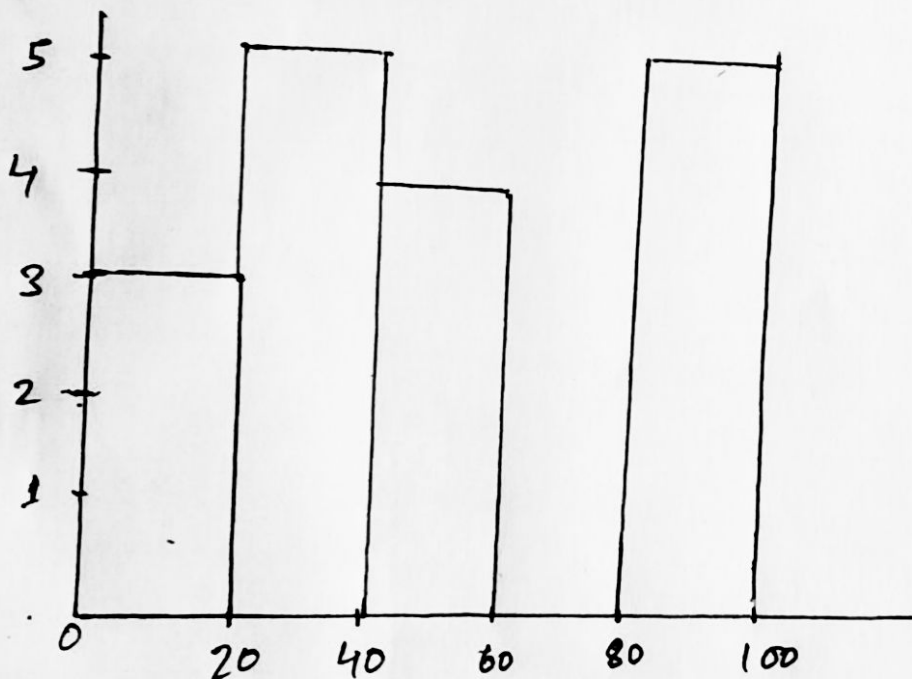
10, 13, 18, 22, 27, 32, 38, 40, 45, 51, 56, 57,
88, 90, 92, 94, 99.

Ans :-

- (i) Sort the number if number is not sorted
- (ii) Number of bins
- (iii) Bins size

Let the number of bins = 5

$$\text{Bin size} = \frac{100}{5} = 20$$



Question - 2

In a quant test of the CAT Exam, The population Standard deviation is known to be 100. A sample of 25 test taken has a mean of 520. Construct 80% CI About the mean.

Ans

Given:

$$\sigma = 100$$

$$n = 25$$

$$\bar{x} = 520$$

$$C.I = 80\%$$

$$\alpha = 1 - 80\% = 0.20$$

- ∴ Whenever population standard deviation is given then use z-score table.

$$\bar{x} \pm z_{\alpha/2} \left(\frac{\sigma}{\sqrt{n}} \right)$$



$$z_{\alpha/2} = z_{0.20/2} = z_{0.10} = 1.28$$

$$1 - 0.10 = .90$$

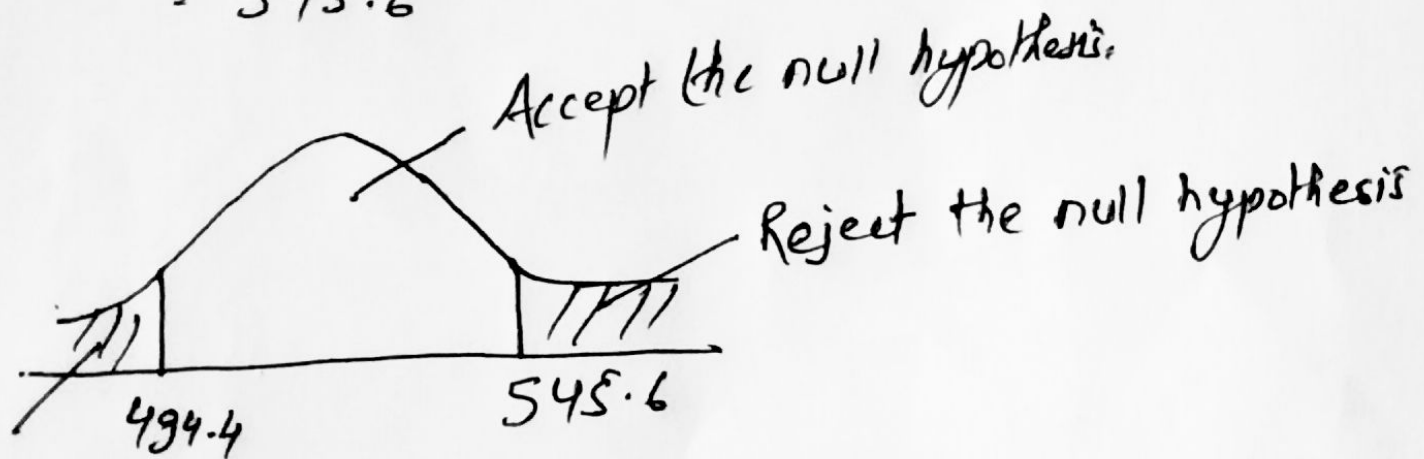
$$\begin{aligned} \text{Lower Fence} &= \bar{x} - z_{\alpha/2} \left(\frac{\sigma}{\sqrt{n}} \right) \\ &= 520 - 1.28 \left(\frac{100}{\sqrt{25}} \right) \end{aligned}$$

$$= 520 - 1.28 \times 20$$

$$= 520 - 25.6$$

$$= 494.4$$

$$\begin{aligned}
 \text{Higler Fence} &= \bar{x} + 2s_{/2} \left(\frac{\sigma}{\sqrt{n}} \right) \\
 &= 520 + 1.28 \left(\frac{100}{\sqrt{25}} \right) \\
 &= 520 + 1.28 \times 20 \\
 &= 520 + 25.6 \\
 &= 545.6
 \end{aligned}$$



Reject the
null hypothesis

question-3

A car believes that the percentage of citizens in city ABC that owns a vehicles is 60% or less. A sales manager disagrees with this. He conducted hypothesis testing surveying 250 residents and found that 170 residents responded Yes to owning a vehicles.

- (a) State null & alternate hypothesis.
(b) At a 10% Significance level, is there enough evidence to support the idea that vehicle owner in ABC city is 60% or less.

Ans

$$H_0: P_0 \leq 60\%$$

$$H_1: P_0 > 60\%$$

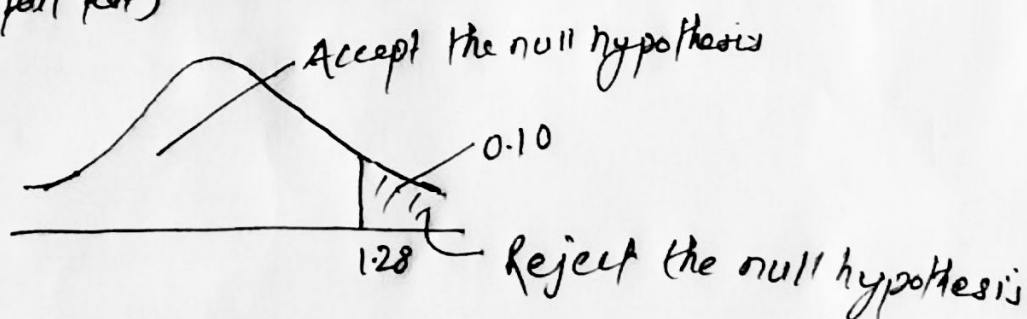
$$n = 250 \quad x = 170$$

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

$$q_0 = 1 - P_0 = 1 - 0.60 \\ = 0.40$$

② $\alpha = 0.10$ C.I: 90%

③ Decision Boundary
(one tail test)



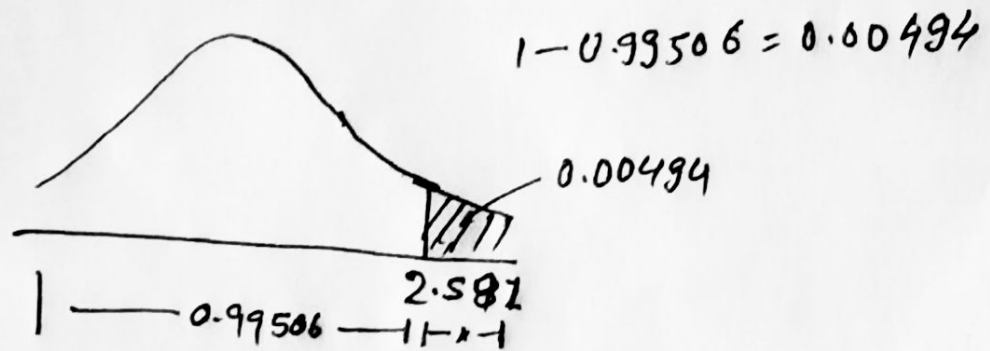
④ z test with proportion

$$z\text{-test} = \frac{\hat{p} - P_0}{\sqrt{\frac{P_0 q_0}{n}}} = \frac{0.68 - 0.60}{\sqrt{\frac{0.60 \times 0.40}{250}}} = \frac{0.08}{0.03098} = 2.587$$

Conclusion

$2.582 > 1.28$ { Reject the null hypothesis }

P-value =



$$P\text{-value} = 0.00494$$

$P\text{-value} < \text{Significance value} \rightarrow \text{Reject the null hypothesis}$

Question-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

Ans :- $n = \text{Total number} = 20$

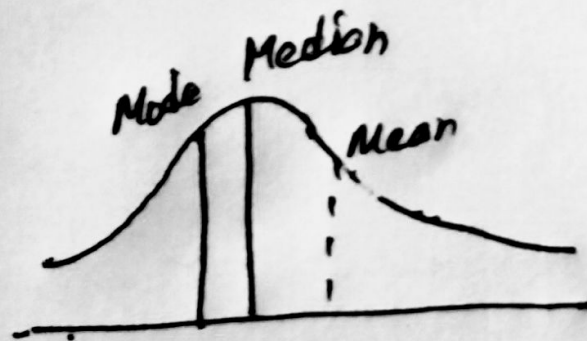
$$\begin{aligned}\text{value} &= \frac{\text{percentile} \times n + 1}{100} \\ &= \frac{99 \times 21}{100} = 20.79\end{aligned}$$

20.79 is index number
But there is no value after 20.79
index number

So
value = 20th index number
= 12

Question-3 In left and right-skewed data, what is the relationship between mean, median and Mode?

Ans



Right skewed
or positive skew

$\text{Mean} > \text{Median} > \text{Mode}$



Left skewed
or Negative skew

$\text{Mode} > \text{Median} > \text{mean}$