

Statistic Assignment

Q.1 Plot a histogram

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

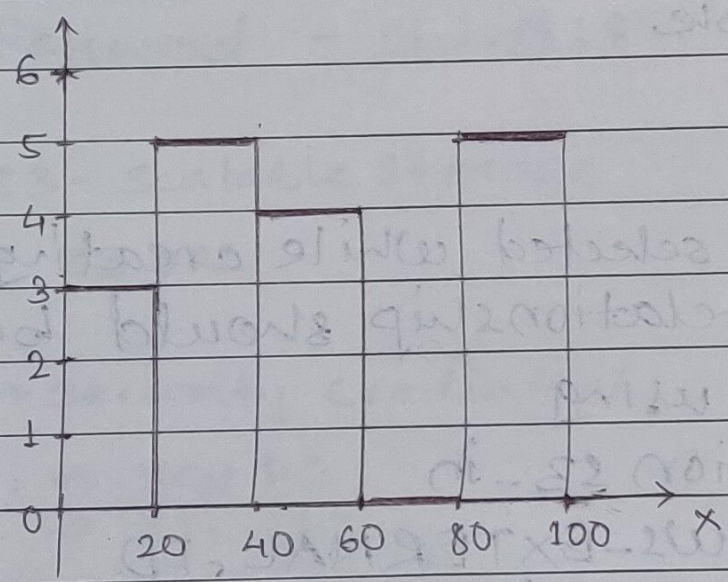
→ Lets consider

Bins = 5

Bin Size = 20

Intervals :

- ① 0 to 20 :- 10, 13, 18 - 3
- ② 20 to 40 :- 22, 27, 32, 38, 40 - 5
- ③ 40 to 60 :- 45, 51, 56, 57 - 4
- ④ 60 to 80 :- - 0
- ⑤ 80 to 100 :- 88, 90, 92, 94, 99 - 5



Q.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.

→ $\sigma = 100$, $n = 25$, $\bar{x} = 520$, $CI = 80\%$.

$$\alpha = 1 - CI$$

$$\alpha = 1 - 0.80 = \boxed{0.20}$$

$$Z_{\alpha/2} = \frac{0.20}{2} = Z_{0.1} = \pm 2.3$$

Lower fence

$$= \bar{x} - Z_{\alpha/2} \frac{\sigma}{\sqrt{n}}$$

$$= 520 - 2.3 \times \frac{100}{\sqrt{25}}$$

$$= 520 - 2.3 \times 20$$

$$= 520 - 46$$

$$= 474$$

Higher fence

$$= \bar{x} + Z_{\alpha/2} \frac{\sigma}{\sqrt{n}}$$

$$= 520 + 2.3 \times \frac{100}{\sqrt{25}}$$

$$= 520 + 2.3 \times 20$$

$$= 520 + 46$$

$$= 566$$

If value drops in the interval of 474 to 566 then accept the null hypothesis otherwise reject the null hypothesis.

Q.3

A car believes that the percentage of citizens in city ABC that owns a vehicle is 60% or less. A sales manager disagree with this. He conducted 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.

→ Here, $n = 250$, $x = 170$

Null hypothesis ; $H_0 = P_0 = 60\%$

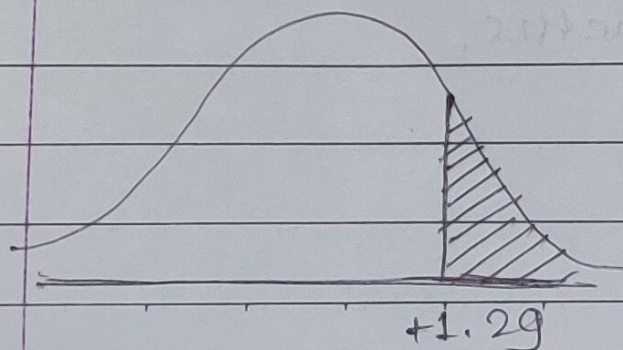
Alternative Hypothesis ; $H_1 = P_0 < 60\%$

$$\hat{p} = \frac{x}{n} = \frac{170}{250} = \frac{17}{25} = \underline{\underline{0.68}}$$

$$q_0 = 1 - P_0 = 1 - 0.60 = \underline{\underline{0.40}}$$

$$\alpha = 10\% = 0.1 ; CI = 90\%$$

$1 - 0.1 = 0.9$. ~~Here we~~ go here we go with z-test with properties.



for value 0.9

z-score = +1.29

from z-table

$$z\text{-test} = \frac{\hat{p} - p_0}{\sqrt{\frac{p_0 q_0}{n}}}$$

$$= \frac{0.68 - 0.60}{\sqrt{\frac{0.60 \times 0.40}{250}}}$$

$$= \frac{0.08}{\sqrt{\frac{0.24}{250}}}$$

$$= \frac{0.08}{\sqrt{0.00096}}$$

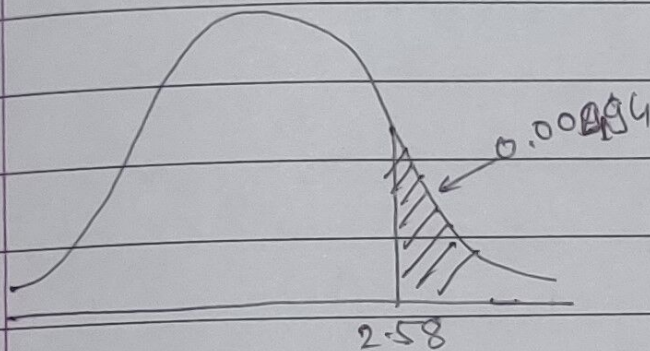
$$z\text{-test} = 2.588 \quad \therefore 2.588 > 1.29$$

\therefore Reject the null hypothesis.

p-value

For $z = 2.588$ from z -table $\Rightarrow 0.99506$

$$P\text{value} = 1 - 0.99506 \Rightarrow \underline{\underline{P\text{value} = 0.00494}}$$



$\Rightarrow P\text{value} < \text{Significance level}$, so reject the null hypothesis.

84 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

→ $n = 20$

$$\text{value} = \frac{\text{Percentile}}{100} \times 20$$

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

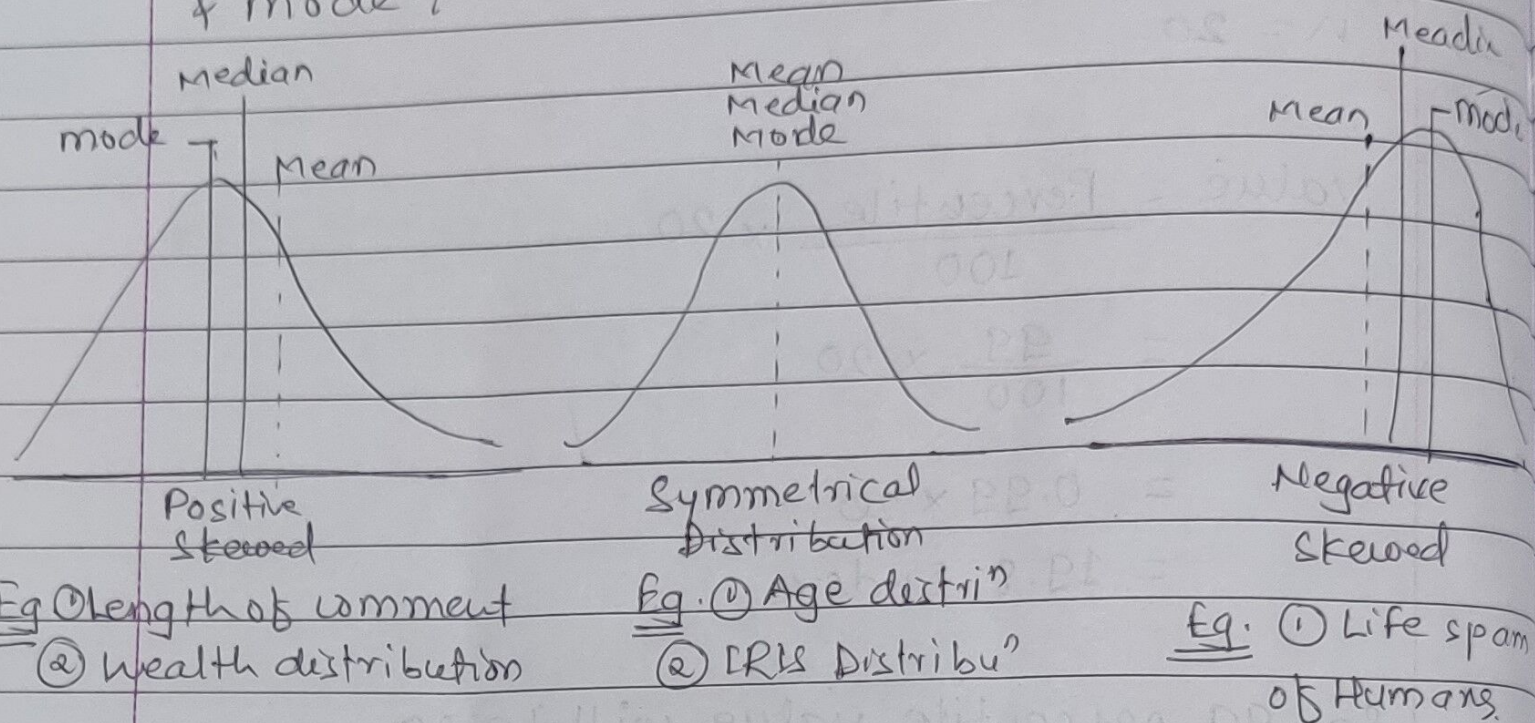
$$= 0.99 \times 20$$

$$= 19.8 \text{ Index}$$

So, 99 percentile value will be 20

Q.5

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



Relationship

Mean > Median > mode

Mean = Median = Mode

Mode > Median > mean

→ Median & Mode should be on L.H.S of mean

→ All, mean, median & mode will be equal here. This distribution also called as Normal Distribution

→ Median & mode will be on R.H.S of mean.