

Statistics Assignment

Que 1) Plot a histogram,

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

Que 1. Plot a histogram.

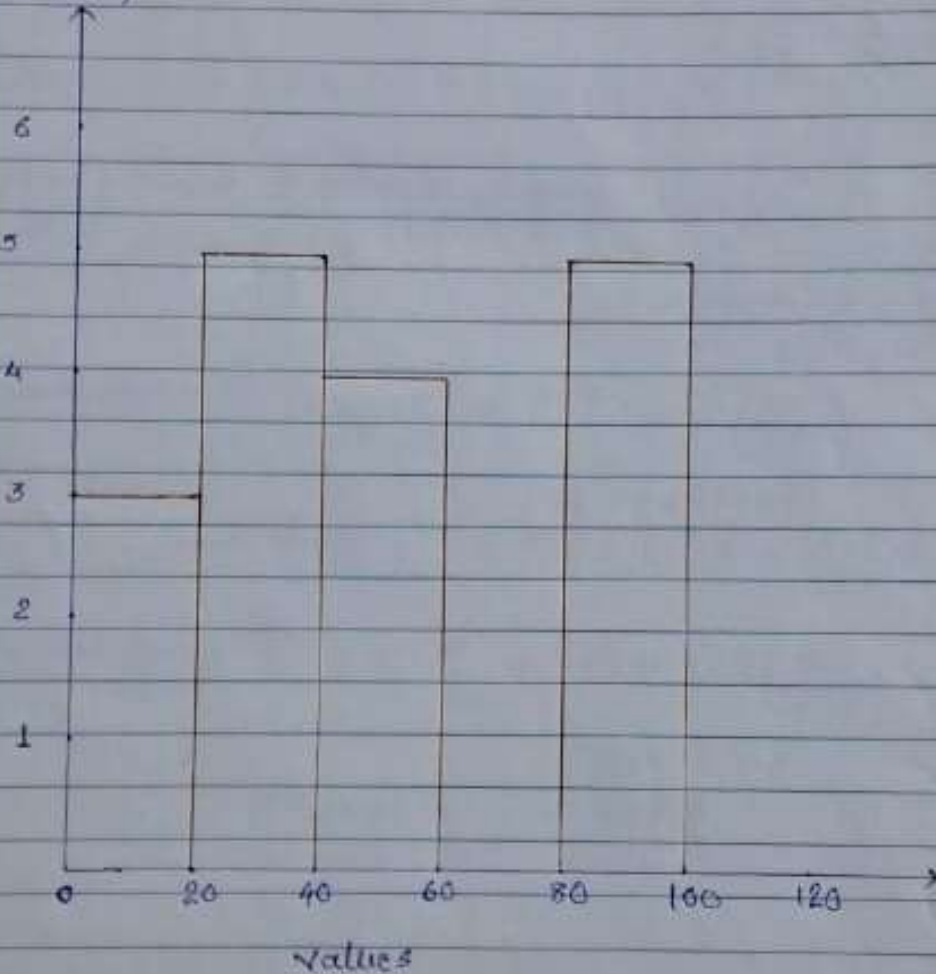
10, 13, 18, 22, 27, 32, 38, 40, 45, 51, 56, 57, 88, 90, 92, 94, 99

bins = 5

bin size = 20

→

Frequency



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.

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.

→ $n=25$, $\bar{x}=520$, $\sigma=100$, $CI=80\%$ (confidence interval)
Significance value, $\alpha = 100 - CI = 100 - 80 = 20\% = 0.2$
 $Z_{\alpha/2} = Z_{0.2/2} = Z_{0.1}$

$$1 - 0.1 = 0.9$$

from Z score table for 0.9 we get 1.29

Point estimate \pm margin of error

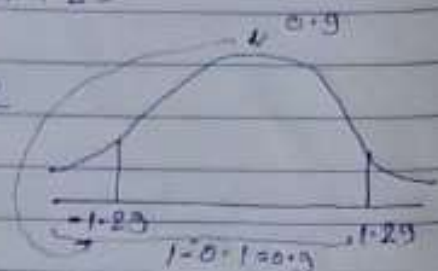
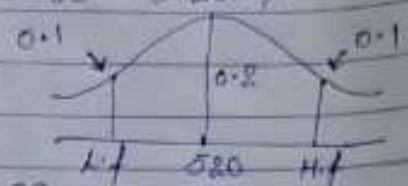
$$\bar{x} \pm Z_{\alpha/2} \frac{\sigma}{\sqrt{n}}$$

$$\text{Lower fence} = \bar{x} - Z_{\alpha/2} \cdot \frac{\sigma}{\sqrt{n}} = 520 - 1.29 \left(\frac{100}{\sqrt{25}} \right)$$

$$\begin{aligned} \text{Lower fence} &= 520 - 1.29(20) \\ &= 520 - 25.8 = 494.2 \end{aligned}$$

$$\text{Higher fence} = \bar{x} + Z_{\alpha/2} \cdot \frac{\sigma}{\sqrt{n}} = 520 + 1.29 \left(\frac{100}{\sqrt{25}} \right)$$

$$\begin{aligned} \text{Higher fence} &= 520 + 25.8 \\ &= 545.8 \end{aligned}$$



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.

Que 3 A car believes that the percentage of citizen 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 and found that 170 residents responded yes to owning a vehicle.

- State the null and 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.

→ Given :- $n = 250$, $x = 170$, $P_0 = 0.6$, $\alpha = 10\% = 0.1$
 $q_0 = 1 - 0.6 = 0.4$ $H_0 : P_0 \leq 0.6$
 $\hat{p} = \frac{x}{n} = \frac{170}{250} = 0.68$ $H_1 : P_0 > 0.6$

$\alpha = 0.1$

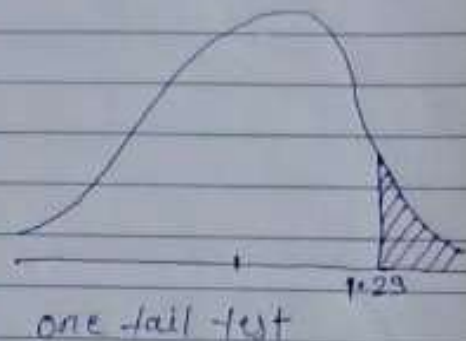
$1 - 0.1 = 0.9$ - from Z-table for $Z_{0.9}$ we get 1.29

Z-test for proportion

$$Z_{test} = \frac{\hat{p} - P_0}{\sqrt{\frac{P_0 q_0}{n}}}$$

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

$$= 2.581$$



$2.581 > 1.29$, So we have to reject the null hypothesis.

Que 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

Que 4. What is the value of 99 percentile?

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

→

Percentile^(%) = $\frac{\text{Number of values fall under 'x'}}{\text{Total number of values}} \times 100$

$$P = \frac{n}{N} \times 100$$

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

$$n = 19.8 \approx 20$$

20th term in the sorted order is 12

99 percentile value is ~~12~~ 12.

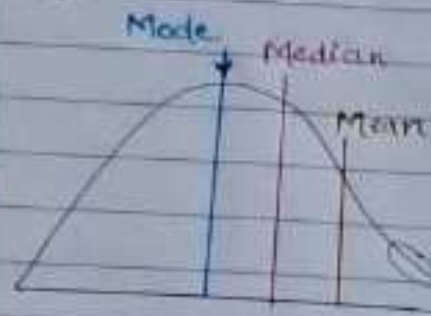
Que 5) In left & right-skewed data, what is the relationship between mean, median & mode?

Draw the graph to represent the same.

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

Draw the graph to represent the same.

→ Right skewed data

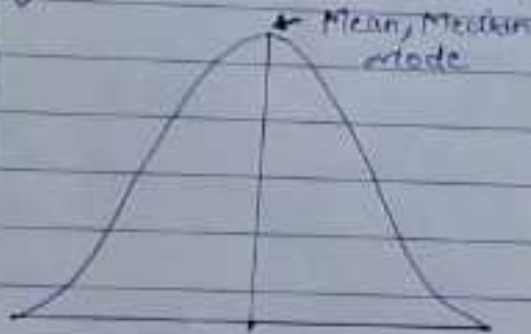


$$\text{Mean} > \text{Median} > \text{Mode}$$

Eg:- Wealth distribution
(The Bill Gates, Musk, Ambani, Adani are in the right side and most people will fall on left side)

↪ length of the comments in social sites.

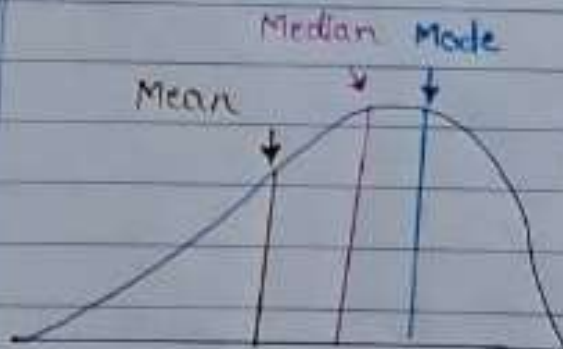
Symmetrical or Normal Distribution



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

Eg:- Age distribution
↪ Weight distribution

Left Skewed data



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

Eg:- Life span of human