Assignment

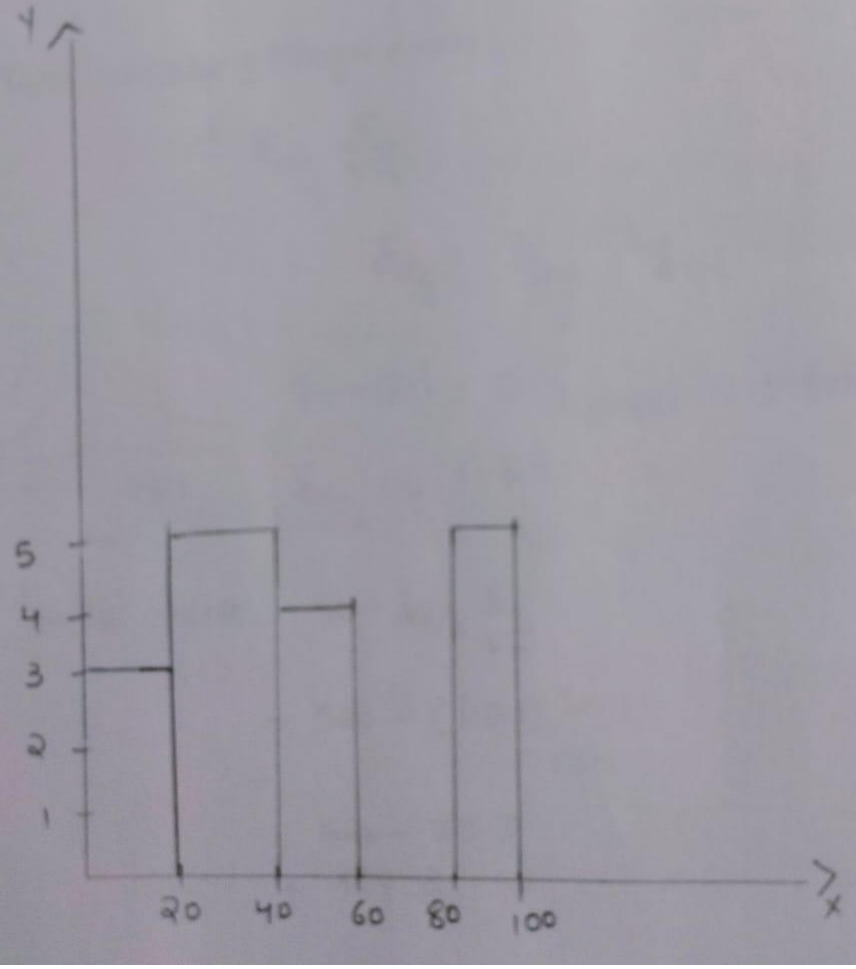
1) Plot a histogram

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

Sol

Bins = 5

Binsize = 20



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.

Sol

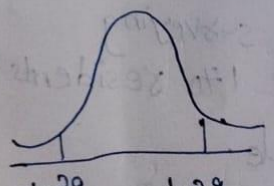
$\bar{x} = 520$, $\sigma = 100$, C.I = 80%, $n = 25$

$\alpha = 0.2$

Point estimator ± Margin error

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

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



$1 - 0.1 = 0.9$ check in z-table

$z_{\alpha/2} = 1.29$

Lower fence : $\bar{x} - z_{\alpha/2} \frac{\sigma}{\sqrt{n}}$

$= 520 - (1.29) \frac{100}{\sqrt{25}}$

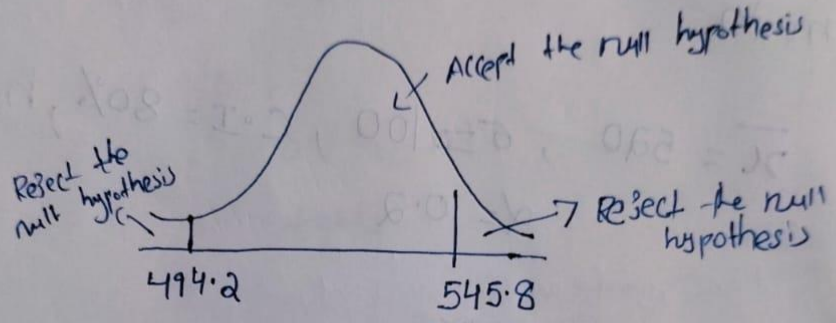
$= 520 - 25.8$

$= 494.2$

Higher fence: $\bar{x} + z_{\alpha/2} \frac{\sigma}{\sqrt{n}}$

$= 520 + 1.29 \frac{100}{\sqrt{25}}$

$= 545.8$



3) A car company believes that the percentage of citizens in city ABC that own 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.

a) State the null and 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.

9d

$H_0 : P_0 = 60\% = 0.6$, $n = 250$, $x = 170$

$H_1 : P_0 \neq 60\%$ $\quad \hat{P} = \frac{x}{n} = \frac{170}{250} = 0.68$

$q_0 = 1 - P_0 = 1 - 0.6$

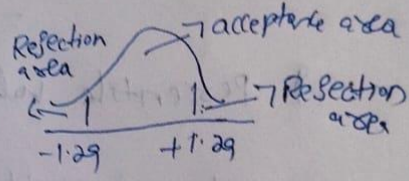
$q_0 = 0.4$

$\alpha = 0.1$

$1 - 0.1 = 0.9$

in z-table

$z_\alpha = 1.29$



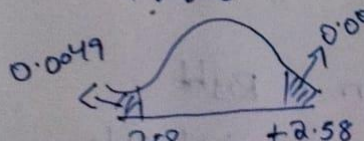
z-test with proportion

$$z\text{-test} = \frac{\hat{P} - P_0}{\sqrt{\frac{P_0 q_0}{n}}} = \frac{0.68 - 0.6}{\sqrt{\frac{0.6 \times (0.4)}{250}}}$$

$= 2.58$

$2.58 > 1.29$ Accept the Null Hypothesis

P value



0.9951

0.9951

Now $1 - 0.9951$

$= 0.0049$

Pvalue $= 0.0049 + 0.0049 = 0.0098$

Pvalue < significance value

Reject the null hypothesis.

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

Sol

$$\text{value} = \frac{\text{Percentile}}{100} \times (n+1)$$

$$= \frac{99}{100} \times (21)$$

$$= 20.79 \text{ (Index)}$$

$$= 12$$

99 Percentile value is "12".

5) In left and right-skewed data, what is the relationship between mean, median and mode ? Draw the graph to represent the same.

Sol

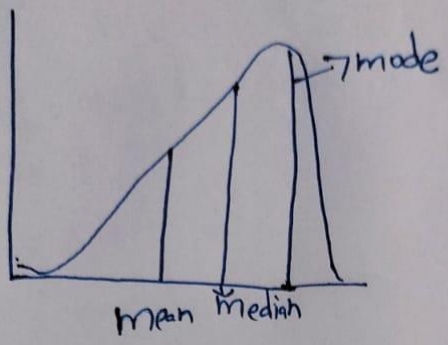
Left skewed data :

- A distribution is left skewed if it has a tail on the left side of the distribution.

Right skewed data :

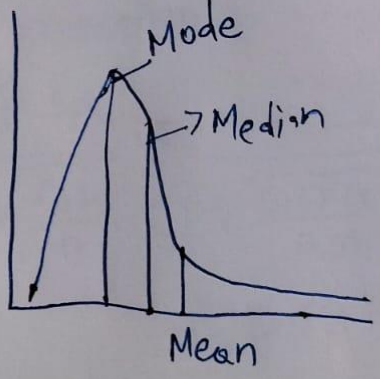
A distribution is Right skewed if it has a tail on the Right side of the distribution.

left skewed :-



In left skewed distribution Mean < Median < Mode

Righ skewed:



In Right skewed distribution Mode < Median < Mean