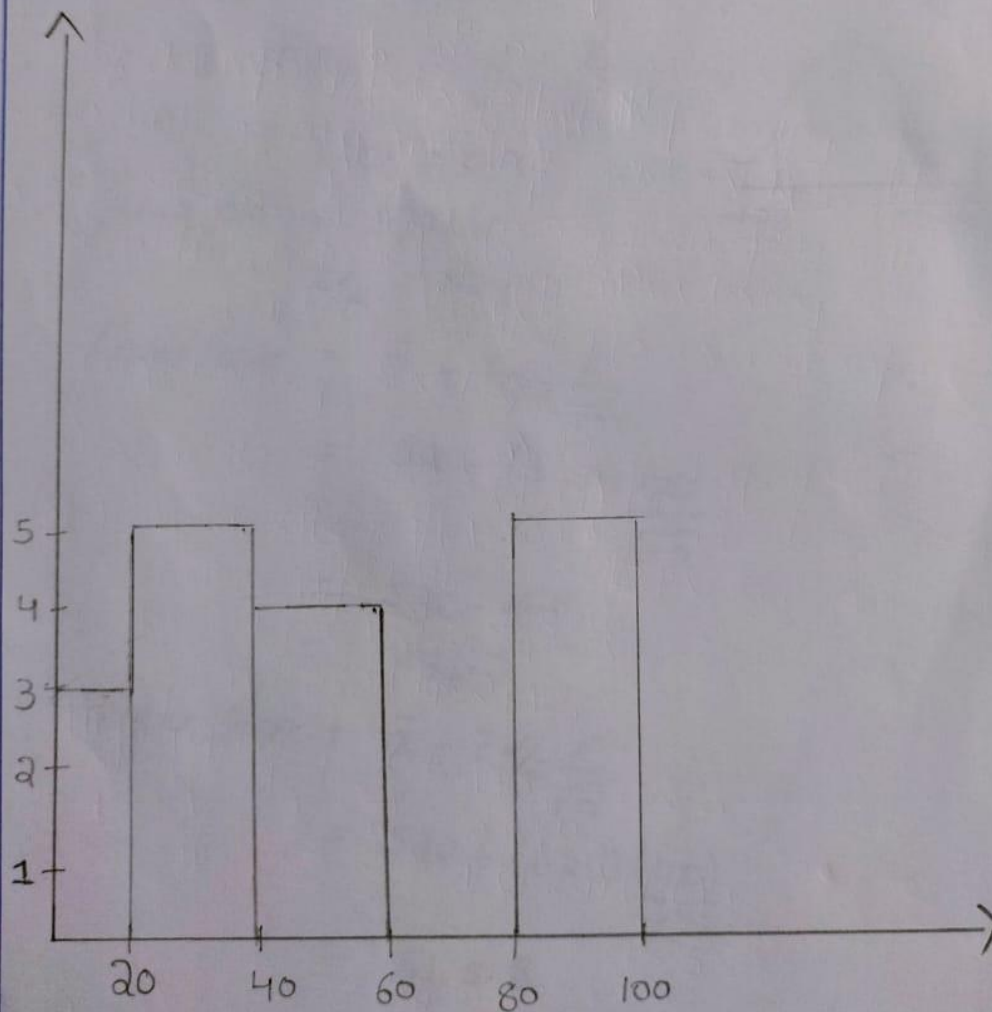# ASSIGNMENT - 1

1) Data points = $\{10, 13, 18, 22, 27, 32, 38, 40, 45, 51, 56, 57, 88, 90, 92, 94, 99\}$ Plot a Histogram.

Bins = 5
Bin Size = 20

a)

In a quant text 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% C.I about the mean.

Sol:-

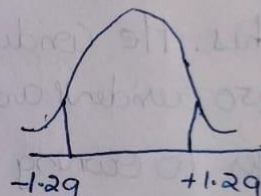$\bar{x} = 520$, $\sigma = 100$, C.I = 80%, $n = 25$, $\alpha = 0.2$

Point estimator $\pm z_{\alpha/2} \dfrac{\sigma}{\sqrt{n}}$

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

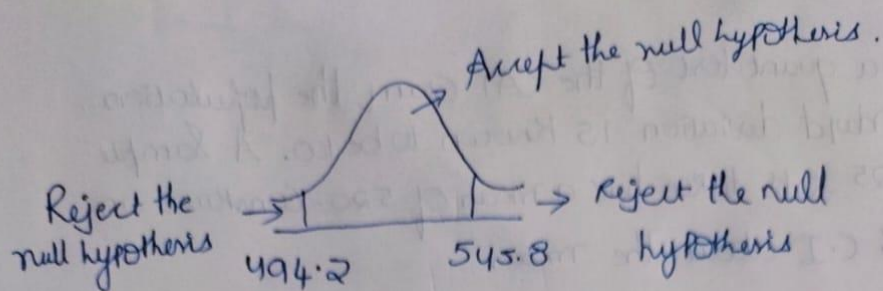$1 - 0.1 = 0.9$

check 0.9 in z-table

$z_{\alpha/2} = 1.29$

Lower Fence $= \bar{x} - z_{\alpha/2} \dfrac{\sigma}{\sqrt{n}}$

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

$= 520 - 25.8$

$= 494.2$

Higher Fence $= \bar{x} + z_{\alpha/2} \dfrac{\sigma}{\sqrt{n}}$

$= 520 + (1.29) \dfrac{(100)}{\sqrt{25}}$

$= 545.8$

Accept the null hypothesis.

Reject the null hypothesis → Reject the null hypothesis

494.2   545.8

3) A car company believes that the percentage of residents 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.

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.

Sol:

$$H_0 : P_0 = 60\%$$
$$H_1 : P_0 \neq 60\%$$

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

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

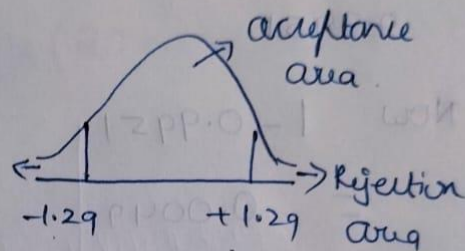$P_0 = 0.6$

$q_0 = 1 - P_0 = 1 - 0.6 = 0.4$

$\alpha = 0.1$

$= 1 - 0.1$

$= 0.9$

In z-table the value is 1.29

$Z\alpha = 1.29$

Rejection area

acceptance area.

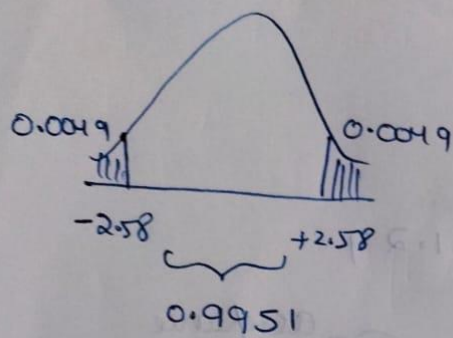−1.29   +1.29   Rejection area

Z-test with proportion

$$Z\text{-test} = \frac{\hat{P} - P_0}{\sqrt{\dfrac{P_0 q_0}{n}}}$$

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

$= 2.58$

$2.58 > 1.29$.

finding P value

0.0049   0.0049

-2.58   +2.58

0.9951

Check the Z-table, Value of 2.58

the value = 0.9951

Now   1 − 0.9951

= 0.0049

P value = 0.0049 + 0.0049 = 0.0098

P value < 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:-

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

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

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

$$= 20.79 \text{ index}$$

Value = 12.

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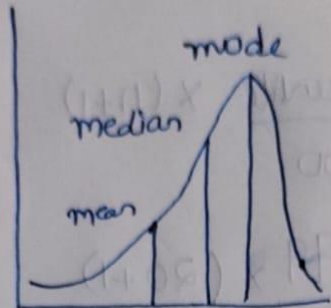Draw the graph to represent the Same.

sol:-

i) Left Skewed :- left skewed distributions are known
as negatively-skewed distribution. the mean is at
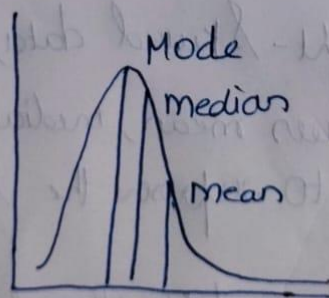the left of the peak. It has a long left tail.

mean < median < mode.

left Skewed

ii) Right Skewed Distribution :-

Right -Skewed distributions are also called Positive skew distribution. the mean is at the right of the peak. It has a long right tail.

mode < Median < Mean.