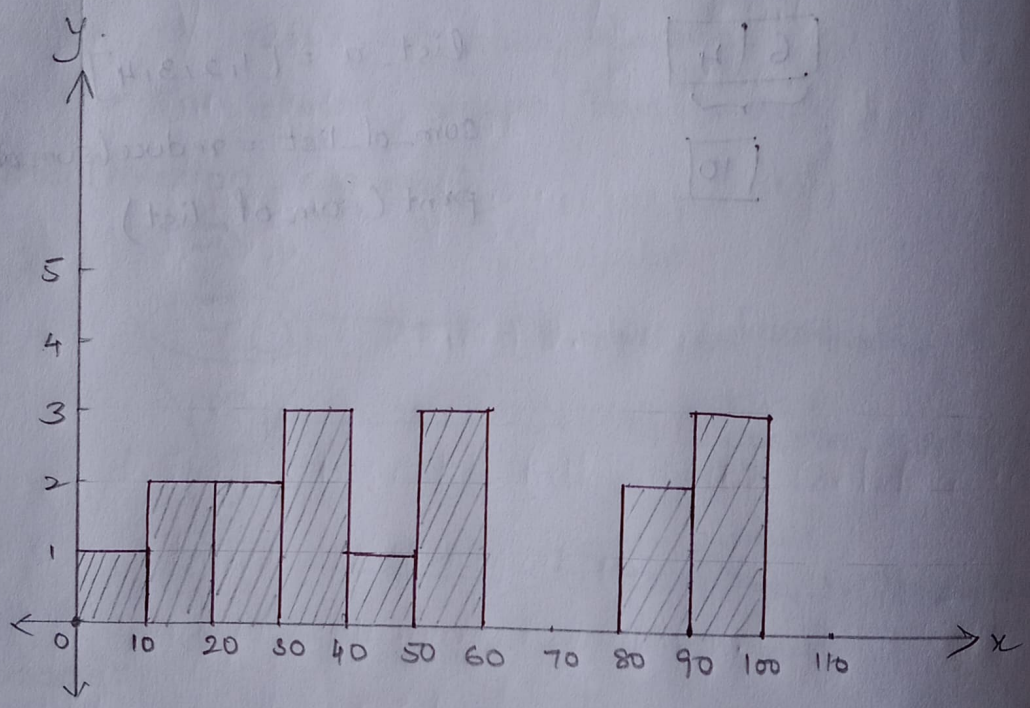
Statistics Assignment

Que 1) Plot a histogram

10, 13, 18, 22, 27, 32, 38, 40, 45, 51, 56, 57,

88, 90, 92, 94, 99.

x-axis - 1 unit = 10 unit
y-axis - 1 unit = 1 unit



Que 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 an 80% CI about the mean.

Given $\sigma = 100$

$n = 25$

$\bar{x} = 520$

$CI = 80\%$

$\alpha = 0.2$

(1)

$H_0 : \mu = 520$

$H_1 : \mu \neq 520$

(2) We know that

$$\Rightarrow 520 \pm Z_{0.2/2} \frac{\sigma}{\sqrt{n}}$$

Higher

$$\Rightarrow 520 + Z_{0.1} \frac{100}{\sqrt{25}}$$

$$\Rightarrow 520 + 1.29 \times 20$$

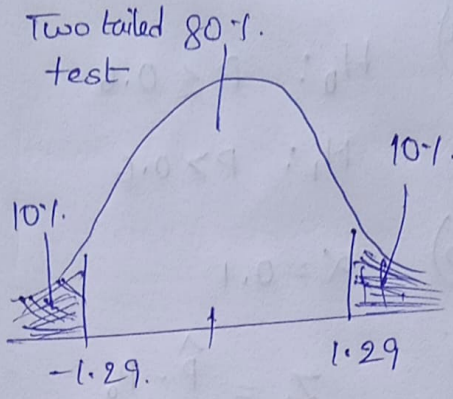
$$\Rightarrow 545.8$$

Lower

$$\Rightarrow 520 - Z_{0.1} \frac{100}{\sqrt{25}}$$

$$\Rightarrow 520 - 1.29 \times 20$$

$$\Rightarrow 494.2$$



$$1 - 0.1 = 0.9$$

$$Z_{0.1} = 1.29.$$

The range is $[494.2 \longleftrightarrow 545.8]$

520 is in the range.

So Accept the Null hypothesis

Reject the Alternate hypothesis.

Que 3) A cop 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.

a) State the 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.

Given

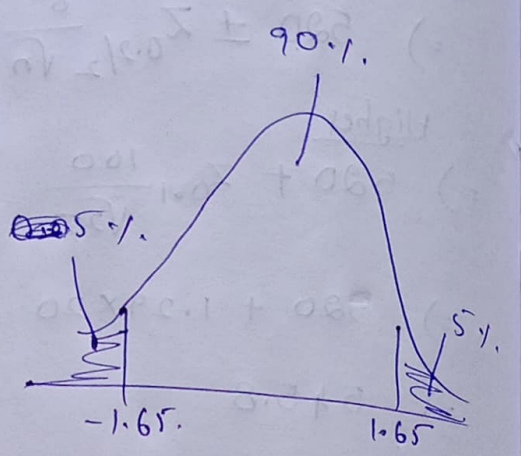
$\alpha = 10\% = 0.1$; $CI = 90\%$

$n = 250.$

a) $H_0: P \leq 0.6$

$H_1: P > 0.6$

b) $\alpha = 0.1$



$Z_{0.05} = 1.65$

c) $$Z_0 = \frac{\hat{P} - P_0}{\sqrt{\frac{P_0(1-P_0)}{n}}}$$

$\hat{P} = \frac{190}{250}$

$P_0 = 0.6$

$n = 250.$

$$= \frac{\frac{190}{250} - 0.6}{\sqrt{\frac{0.6(1-0.6)}{250}}}$$

$$= \frac{0.68 - 0.6}{\sqrt{\frac{0.6 \times 0.4}{250}}} = \frac{0.08}{\sqrt{\frac{0.24}{250}}}$$

$$= \frac{0.08}{0.0309} = 2.5889.$$

2.5889 does not fall in the Confidence Interval

So Reject Null hypothesis

Accept Alternate hypothesis.

Not enough evidence to support.

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.

Given dataset :-

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

$n = 20$

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

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

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

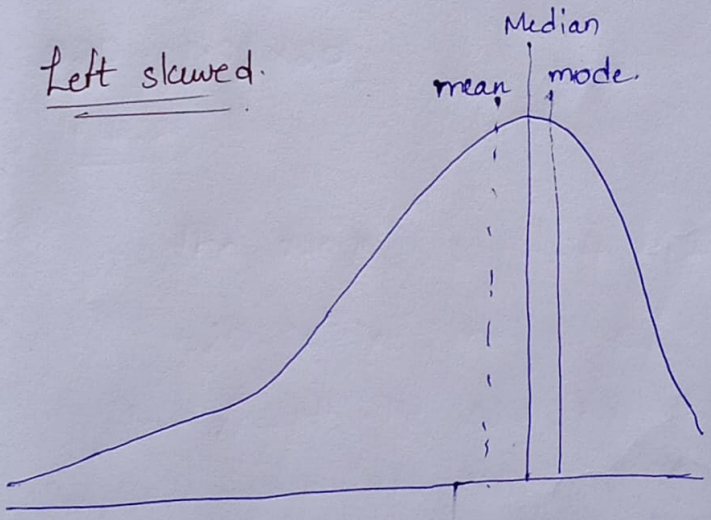
$$= 0.99 \times 21$$

$$= 20.79 \rightarrow \text{Index}.$$

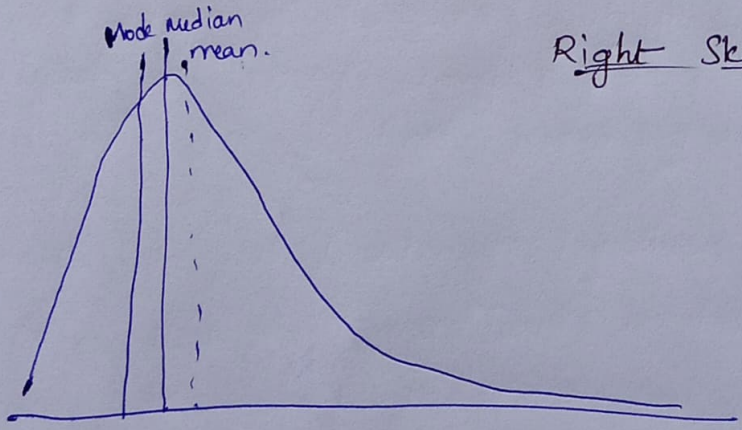
The 20 Index value is 12.

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

Left skewed.



The relationship mode > median > mean.



Right Skewed.

The relationship Mean > median > mode.