

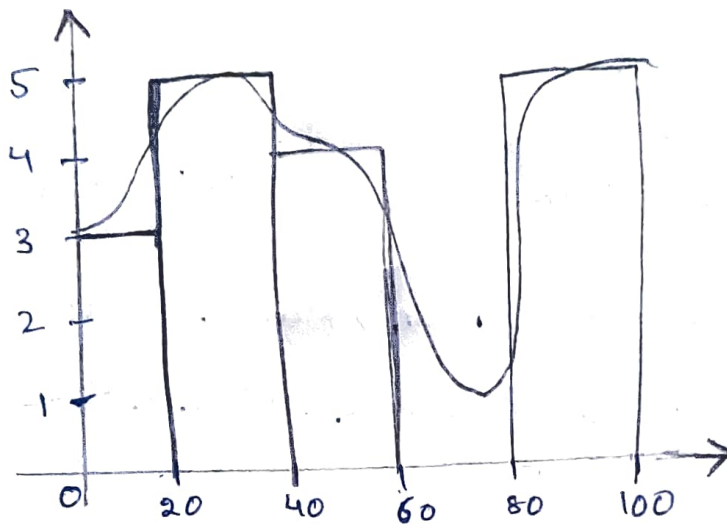
Statistics Assignment

① Plot a histogram

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

Consider bins = 5

Then BinSize = $20 \left(\frac{100}{5} \right)$



④ What is the value of 99 Percentile?

Data :- { 2, 2, 3, 4, 5, 5, 5, 6, 7, 8, 8, 8, 8, 8, 9, 9, 10, 11, 11, 12 }

$$\text{Value of } 99\% = \frac{99}{100} (n+1)$$

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

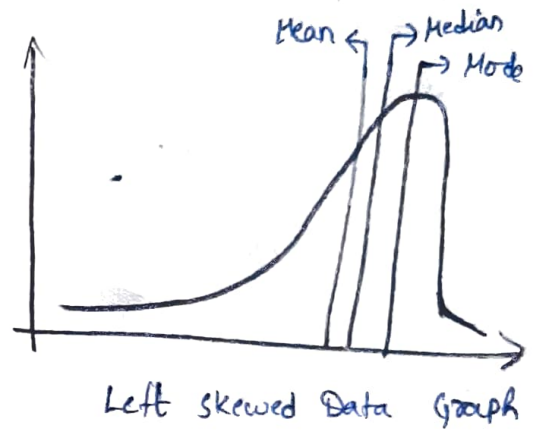
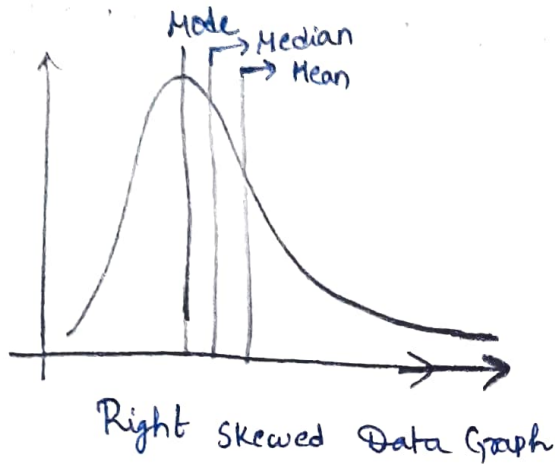
$$= \frac{99}{100} (21)$$

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

There are 20 values Take last index

12 is the 99 Percentile of the given data

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



In Right skewed $\text{Mean} > \text{Median} > \text{Mode}$

In Left skewed $\text{Mean} < \text{Median} < \text{Mode}$

- 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.

Given $\sigma = 100$, $n = 25$, $\bar{x} = 520$

$$CI = 80\%$$

$$\alpha = 1 - CI$$

$$= 1 - 0.8 = 0.2$$

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

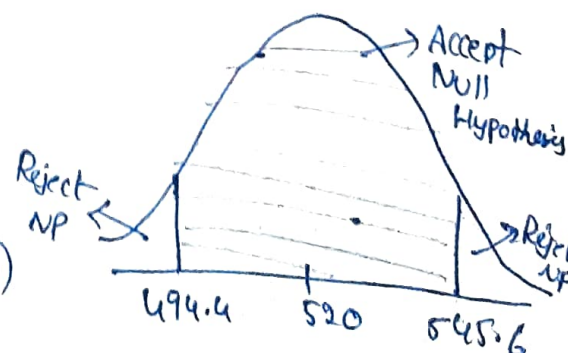
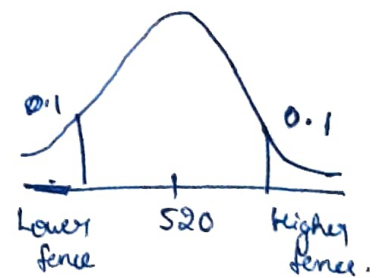
$$= 520 - Z_{0.1} \frac{100}{\sqrt{25}}$$

$$= 520 - (1.28)(20)$$

$$= 494.4$$

$$\text{Higher fence} = 520 + (1.28)(20)$$

$$= 545.6$$



⑤ 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.

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,

$$\text{Null hypothesis } H_0 : P_0 \leq 60\% \quad q_0 = 1 - P_0 = 1 - 0.6 = 0.4$$

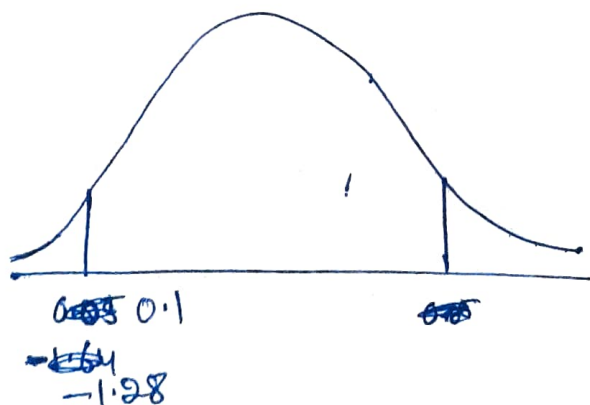
$$H_1 : P_0 > 60\%$$

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

Given, significance level at 10% $\alpha = 0.1$

$$Z_{\text{test}} = \frac{\hat{p} - P_0}{\sqrt{\frac{P_0 q_0}{n}}} = \frac{0.68 - 0.6}{\sqrt{\frac{0.6 \times 0.4}{250}}} \approx 2.581$$

If $\alpha = 0.1$ then $CI = 1 - 0.1 = 0.9$



$$-1.28 < 2.58$$

so we reject Null hypothesis

By using P-value $P\text{-value} = 0.0494 < 0.1$

$P\text{-value} < \text{significance value} \rightarrow \text{Reject Null hypothesis}$