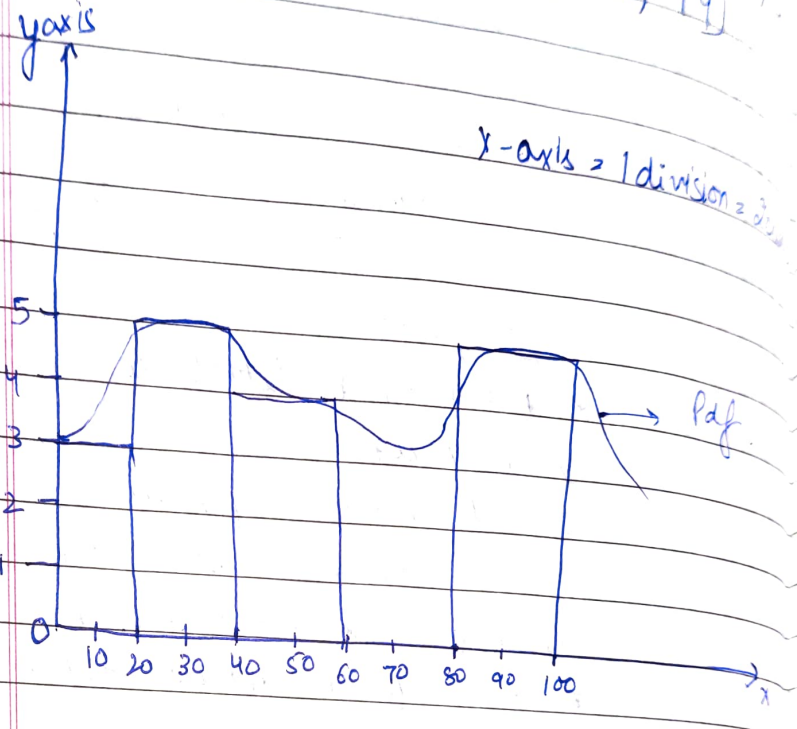
Assignment - 1 Statistics

Q-1. Plot a histogram,
10, 13, 18, 22, 27, 32, 38, 40, 45, 51, 56, 57, 88, 90, 92, 94, 99

Sort it in Ascending Order :-
[10, 13, 18], [22, 27, 32, 38, 40], [45, 51, 56, 57], [88, 90, 92, 94, 99]



Ques2. 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.

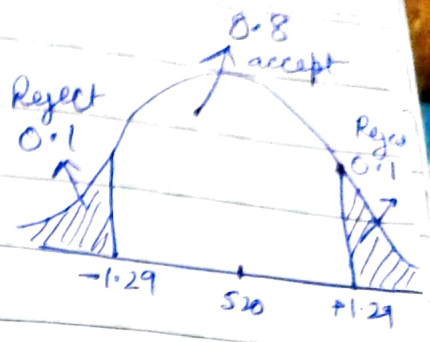
$n < 30 \rightarrow$ Z-test

$\sigma = 100$, $n = 25$, $\bar{X} = 520$, C.I = 1 - 0.8 = 0.2

C.I = Point Estimate ± Margin of Error

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

$$520 \pm 1.29 \times \frac{100}{\sqrt{25}}$$



Highest = $520 + 1.29 \times 20$

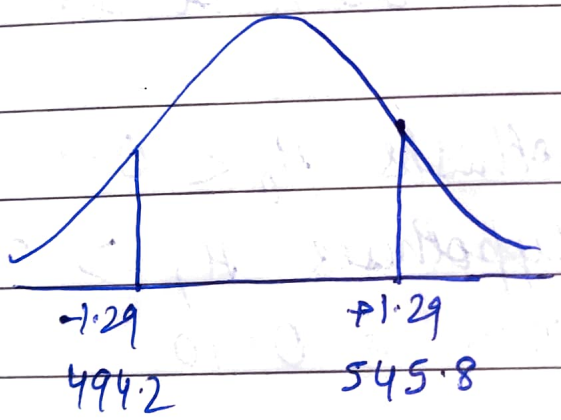
$520 + 25.8$

$= 545.8$

Lowest = $520 - 1.29 \times 20$

$520 - 25.8$

$= 494.2$



Q-3. A Car believes that the percentage of city in City ABC that owns a Vehicle is 60%. A sales manager disagrees with this. He conducted a hypothesis testing surveying 250 & found that 170 residents responded owing a Vehicle

a) State the Null & alternate hypothesis
b) At a 10% significance level, is there enough evidence to support the idea that Vehicle in ABC City is 60% or less.

Ans 3 Null Hypothesis $H_0 \leq 0.60$

Alternate Hypothesis $H_1 \geq 0.60$

α Value = 10% = 0.10

C.I = 0.90

$$Z_0 = \frac{\hat{p} - p^0}{\sqrt{\frac{p_0(1-p_0)}{n}}}$$

$$\hat{p} = \frac{x}{n}$$

$$= \frac{170}{250}$$

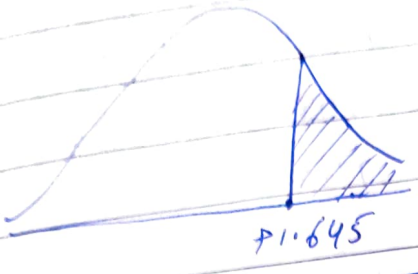
$$= 0.68$$

$$Z_0 = \frac{0.68 - 0.60}{\sqrt{\frac{0.60(1-0.60)}{250}}}$$

$$Z_0 = \frac{0.08}{\sqrt{\frac{0.60(0.4)}{250}}}$$

$$Z_0 = \frac{0.08}{0.0309} = \boxed{2.58} \rightarrow \text{Calculated Value}$$

$A_2 = 0.95 = \boxed{1.645}$ ↓ Tabulated Value



$2.58 > 1.645$

∴ We will reject Null Hypothesis and we can say that there is enough evidence to reject to support the idea that the vehicle ownership in City ABC is 60% or less.

Q-4) What is the value of the 99 percentile?

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

Sort in Ascending order :- 2, 2, 3, 4, 5, 5, 5, 6, 7, 8, 8, 8, 8, 9, 9, 10, 11, 11, 12

$$P(x) = \frac{x}{100} \times (n+1)$$

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

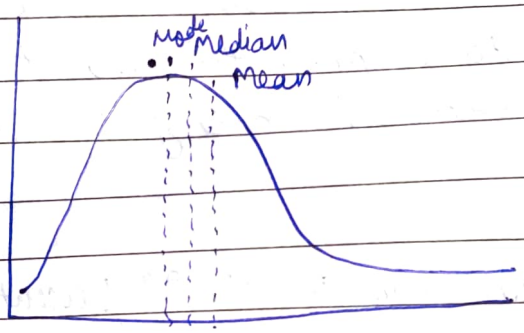
$$= \frac{99}{100} \times 21 = 20.79 \rightarrow \text{Index position}$$

Value = 12

Q-5 In left & right skewed data, what is the relationship b/w mean, median & mode? Draw graph to represent the same.

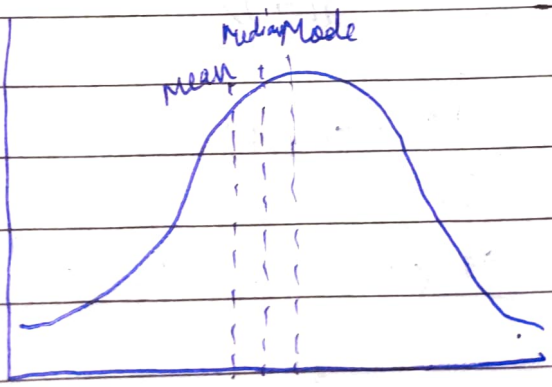
a) In a positively skewed distribution, the median and mode would be to the left of the mean. That means that the mean is greater than the median and the median is greater than the mode.

Mean > Median > Mode



b) In a negatively skewed distribution, the mean is greater than the median and the median greater than the mode.

Mode > Median > Mean



Negative skewed frequency distribution