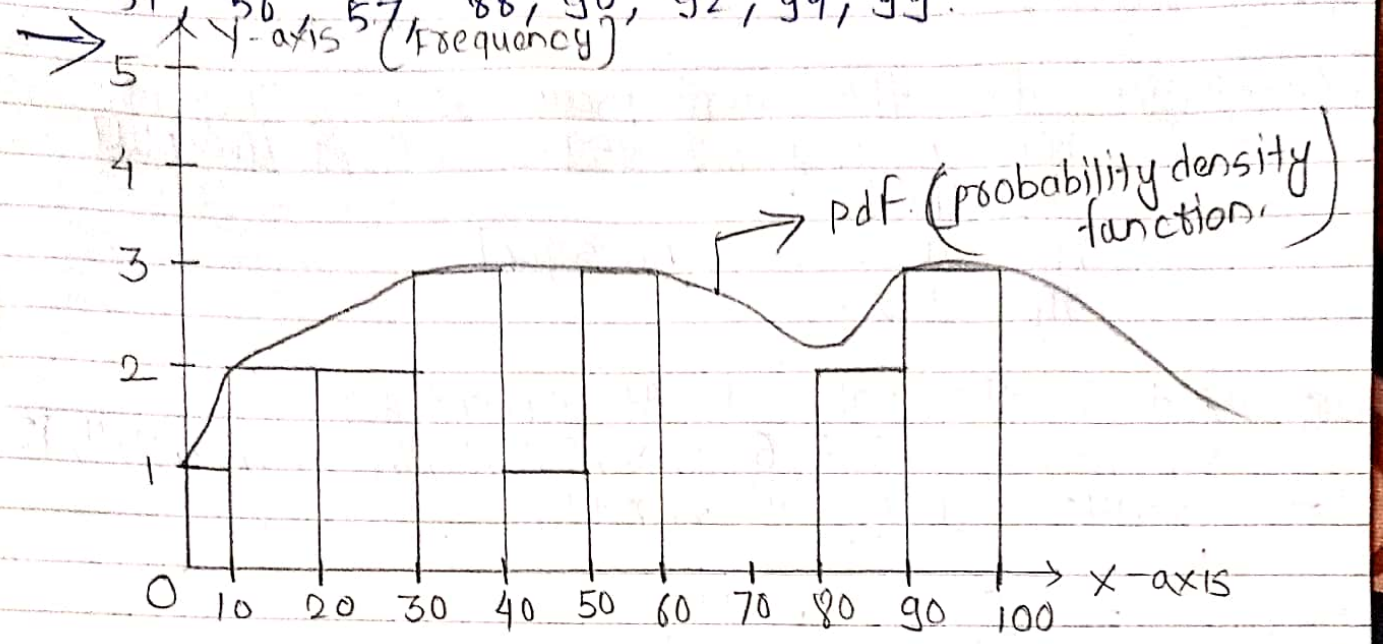
Assignment No :- 6. 1st for STATISTICS

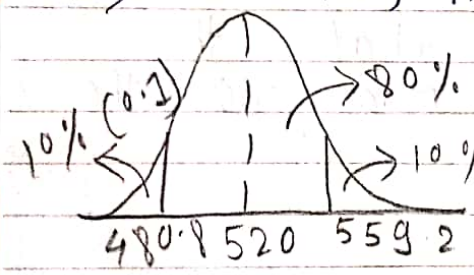
Q.1) Plot a Histogram. 10, 13, 18, 22, 27, 32, 38, 40, 45, 51, 56, 57, 88, 90, 92, 94, 99.




Here, Bin size = 10 ; no. of bins = 10.

Q.2) In a quant test of CAT exam, the population S.D ($\sigma$) = 100, a sample of 25 test taken has a mean of 520. Construct a 80% C.I about the mean.

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




As, sample size is less than 30 i.e., $n < 30$ will use Z-score.

$\therefore C.I = \bar{x} \pm Z_{\alpha/2} \times \left(\frac{\sigma}{\sqrt{n}}\right)$

NOTE :- As '$\alpha$' is not mentioned in the problem statement will use $\alpha = 0.05$

$C.I = 520 \pm Z_{0.05/2} \times \left(\frac{100}{\sqrt{25}}\right)$

$= 520 \pm Z(0.025) \times 20$

$\therefore C.I = 520 - 1.96 \times 20$

C.I (Lower Fence) = 480.8

C.I (Higher Fence) $= 520 + 1.96 \times 20 = \underline{559.2}$

Conclusion: As the sample mean 520 is lying in between 480.8 & 559.2. Accept the null hypothesis i.e.,
$H_0 : \mu = 520$ and reject
$H_1 : \mu \neq 520$.

Q. What is the value of 99 percentile?
2, 2, 3, 4, 5, 5, 5, 6, 7, 8, 8, 8, 8, 8, 9, 9, 10, 11, 11, 12

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

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

$= 20.79$.

Here, 20.79 is the index, which indicates avg of 20th & 21th index.

$= \left(\frac{12+12}{2}\right) = \frac{24}{2} = 12$

∴ So, the value of 99 percentile is 12

Q. In left & right skewed data, what is the relatn betn mean, median and mode? Draw the graph to represent the same.

$\Rightarrow$

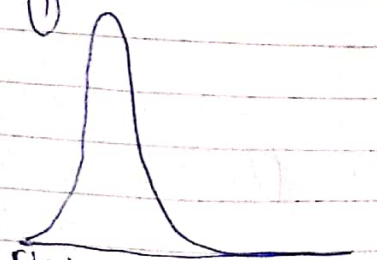
① 

Fig: Right skewed Data.
Here, mean > median > mode

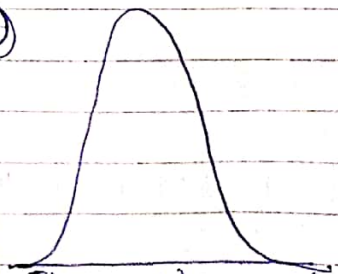
② 

Fig: Normal Distributn
Here, mean ≈ median ≈ mode

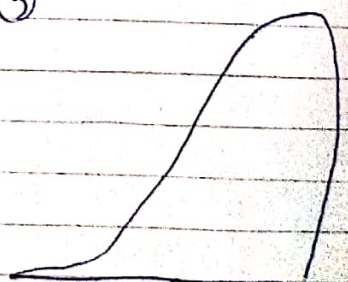
③ 

Fig: left skewed Data.
Here, Mode > median > mean.

Q. A car believes that the % of citizens in city ABC that owns a vehicle is 60% or less. A sales manager disagrees with this. He conducted hypothesis testing surveying 250 residents & found that 170 residents responded yes to owning a vehicle.

(a) State null & alternate hypothesis.

(b) At 10% significance level, is enough evidence to support the idea that vehicle owners is 60% or less.

⇒ (I) $H_0$ : $\mu \leq 60\%$.

$H_1$ : $\mu > 60\%$

(II) 10% significance level. i.e, $\alpha = 0.1$.

$\bar{x} = 170$, $n = 250$, $\alpha = 0.1$.

$P_0 = 0.60$

$\therefore \hat{p} = \frac{170}{250} = 0.68$

$\therefore$ Z-score $= \frac{\hat{p} - P_0}{\sqrt{\frac{P_0(1-P_0)}{n}}} = \frac{0.68 - 0.60}{\sqrt{\frac{0.60(1-0.60)}{250}}}$

$= \frac{0.08}{\sqrt{\frac{0.24}{250}}} = 2.5399$

$\alpha = 0.1$ $\therefore$ $1 - 0.05 = 0.95$. In Z-table the value is 1.65

As, $2.53 > 1.65$, Reject the null hypothesis.

Conclusion : There are more than 60% people who own vehicle in ABC city.