ASSIGNMENT:

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

Sol-①.

10-20 includes 10. ∿ 40-50 includes 40 ∿ 90-100 includes 90
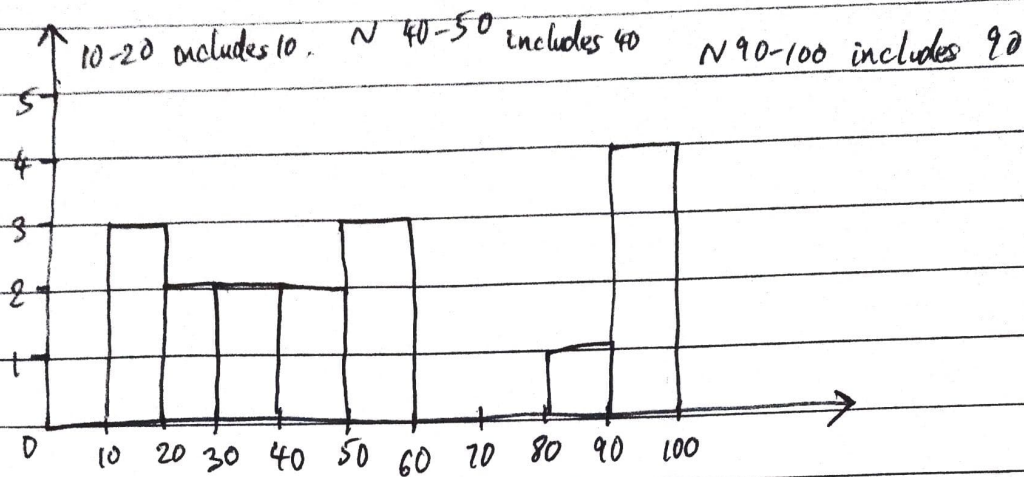
Q.②. In a Quant test of CAT, the σ is known to be 100. A sample of 25 tests taken has a mean of 520. Construct an 80% CI about the mean.

Sol.②. $\sigma = 100$. $n = 25$. $\bar{x} = 520$.   CI = 80% ∴ $\alpha = 0.2$.

CI = Pt. Estimate ± Margin of Error.

~~Lower fence~~ ∵ σ given ∴ Z table referred for $Z_{\alpha/2}$ value.

$$Z_{\alpha/2} \cdot |_{\alpha/2 = 0.01} \Rightarrow -1.28.$$

Lower fence $= \bar{x} - (Z_{\alpha/2})(\sigma/\sqrt{n}) \Rightarrow 520 - (1.28)(100/\sqrt{25})$.

$$\Rightarrow \text{Lower fence} = 494.4.$$

Higher fence $= \bar{x} + (Z_{\alpha/2})(\sigma/\sqrt{n})$

$$\Rightarrow 520 + (1.28)(100/\sqrt{25}).$$

$$\Rightarrow 545.6.$$

Q.②. A car company beleives that the % 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.

i). State the Null & Alternate hypothesis.

ii). At a 10% significance level, is there enough evidence to support the idea that vehicle owners in ABC city is 60% or less?

Sol.②. $P_0 \leq 0.6$. $\therefore Q_0 = 1 - P_0 \Rightarrow Q_0 = 0.4$.

$n = 250$. $x = 170$. $\alpha = 0.1$.

S1: $H_0 : P_0 \leq 60\%$ or 0.6 $\qquad H_1 : P_0 > 60\%$.
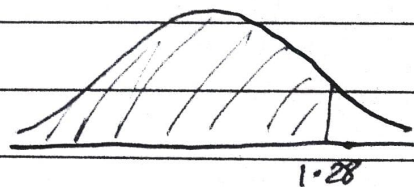
$S_2 : \alpha = 0.1$. One tail test.

$S_3 :$ Decission Boundary (Rule).

$Z_\alpha = -1.28$ on LHS.

$\therefore Z_\alpha = +1.28$ on RHS.

1.28

$S_4 :$ Calculate test stats.

$$Z_{test} = \frac{\hat{P} - P_0}{\sqrt{\dfrac{P_0 Q_0}{n}}} \qquad \text{where, } \hat{P} = x/n \Rightarrow 170/250$$

$$\Rightarrow \hat{P} = 0.68.$$

$$\Rightarrow Z_{test} = \frac{0.68 - 0.6}{\sqrt{\dfrac{0.6 \times 0.4}{250}}} \qquad \Rightarrow Z_{test} = \frac{0.08}{0.0309} \Rightarrow Z_{test} = 2.589.$$

$\therefore Z_{test} = 2.589 > 1.28$. $\qquad \therefore$ Reject H_0.

Q.(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.(4). $\text{Index} = \dfrac{\text{Percentile}}{100} \times (n+1) \Rightarrow \text{Index} = \dfrac{99}{100} \times (20+1) \Rightarrow \text{Index} = 20.79$.

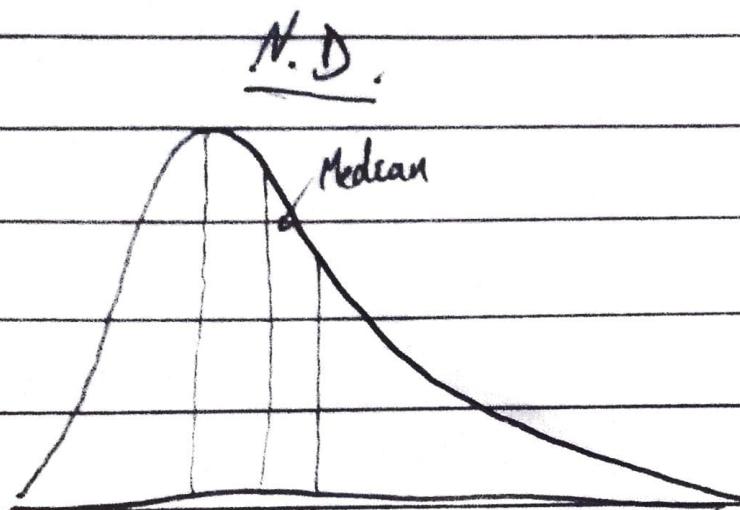∴ Value at 99 percentile ⟶ $= \dfrac{\text{Value @20} + \text{Value @21}}{2} = \dfrac{12+0}{2}$

$= 12$ ∴ no other value present after 20th position.

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

Sol.5)

Mean, Median & Mode

Median

N.D.

Mean Mode
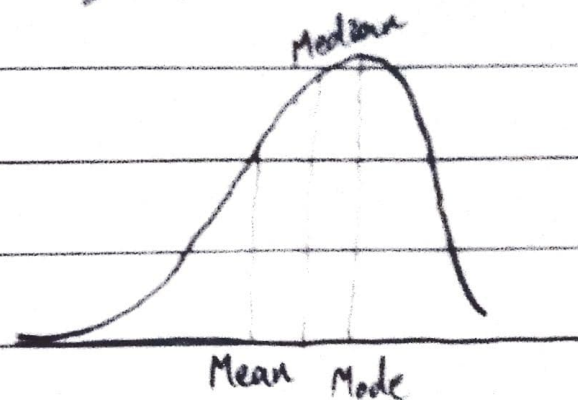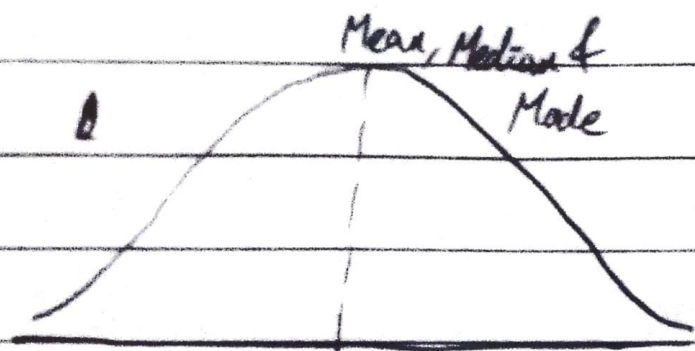
Left skewed distribution

Median

Mode   Mean

Right skewed distribution