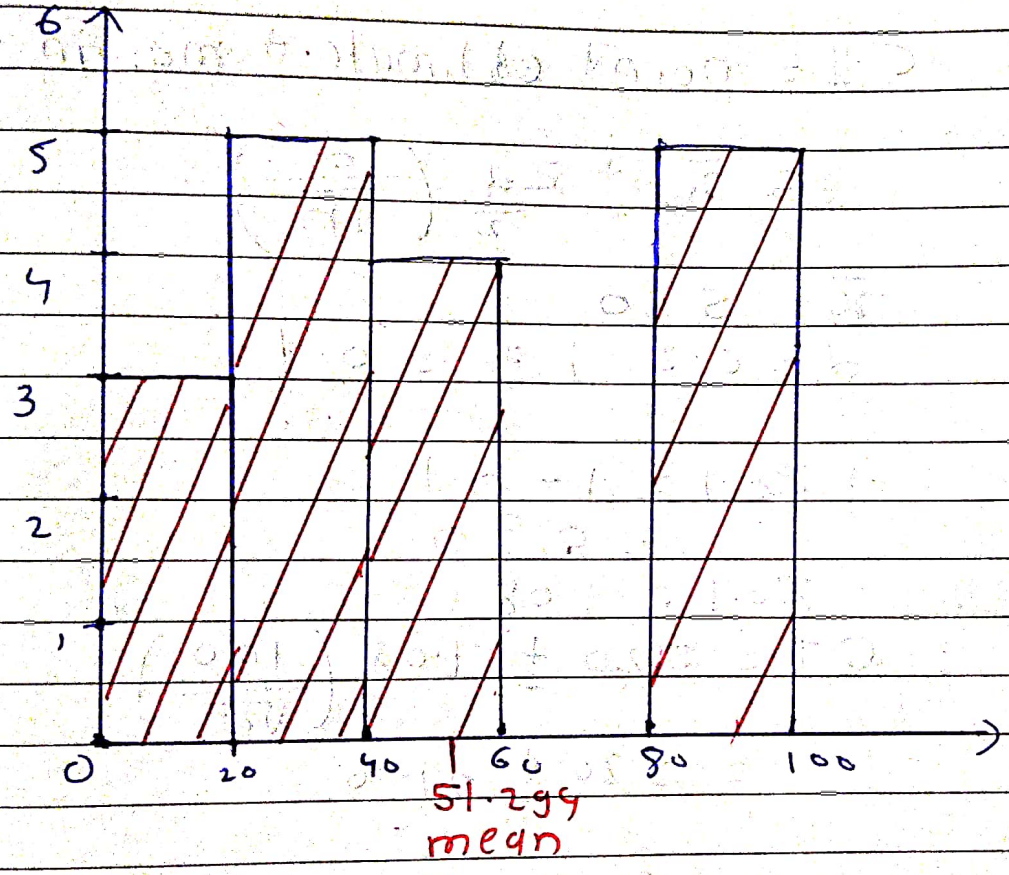
Assignment no. 1

STATISTICS

Q.1 plot a histogram

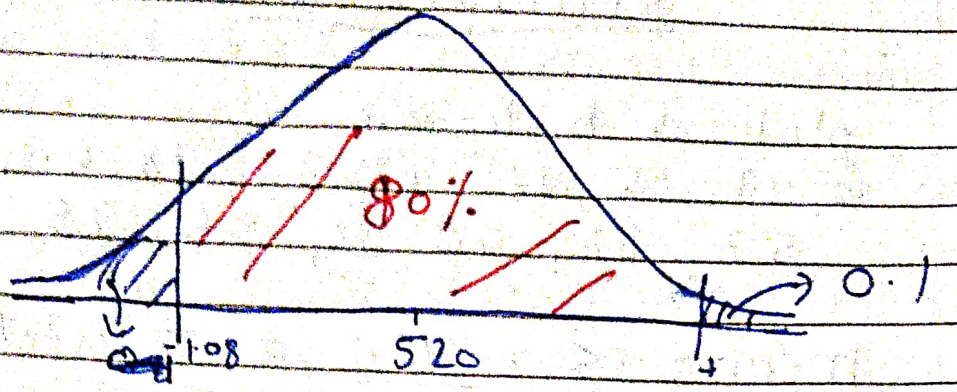
10, 13, 18, 22, 27, 32, 38, 40, 45, 51, 56, 57, 88, 90, 92, 94, 99

$$\text{mean} = \sum_{i=0} = \frac{x_i}{N} = 51.294$$



Q.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 ~~abo~~ about the mean

→ $\alpha = 0.20$.



C.I = point estimate ± margin of error

$$= \bar{x} \pm z_{\frac{\alpha}{2}} \left(\frac{\sigma}{\sqrt{n}}\right)$$

$\bar{x} = 520$

$\alpha = 0.2$; $\frac{\alpha}{2} = 0.1$

$\therefore z_{0.1} = 1 - 0.1$

$= 0.90$

$z_{0.1} = 1.08$

$\therefore C.I = 520 \pm 1.08 \left(\frac{100}{\sqrt{25}}\right)$

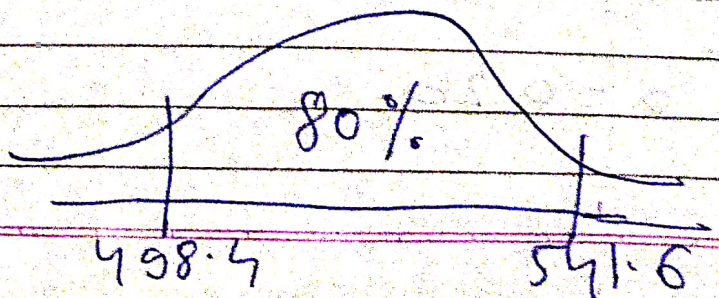
$= 520 \pm 21.6$

$\therefore$ Lower fence $= 520 - 21.6$

Higer fence $= 520 + 21.6$

Lower fence $= 498.4$

Higer fence $= 541.6$



Q.3 A car believes that the percentage of citizens in city ABC that owns a vehicle is 60% or less. A sales manager disagree 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% significant level, is there enough evidence to support the idea that vehicle owner in ABC city is 60% or less

Null Hypothesis H_0 :- $P_0 \leq 60\%$
Alternate Hypothesis H_1 :- $P_0 > 60\%$.

$P_0 = 0.60$, $n = 250$

$\bar{P} = \frac{170}{250} = 0.68$

We know the formula of z-test with proportion

$$Z\text{-score} = \frac{\bar{P} - P_0}{\sqrt{\frac{P_0(1-P_0)}{n}}} = \frac{0.68 - 0.60}{\sqrt{\frac{0.60(1-0.60)}{250}}}$$

$$Z\text{-score} = \frac{0.08}{\sqrt{\frac{0.24}{250}}} = 2.5399$$

$\alpha = 0.1$ ∴ $1 - 0.05 = 0.95$

$= 1.65$

$2.53 > 1.65$

Reject the Null Hypothesis

Accept the Alternate Hypothesis

Conclusion :- There is more than 60% people who own's vechicle in ABC city

Q. What is the value of 99 percentile?

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

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

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

$$= 20.79$$

Here, 20.79 is the index, which indicates avg of 20th & 21 the index value = 12

Q. In left & right skewed data, what is the relation between median, mean & mode Draw the graph to represent the same.

⇒

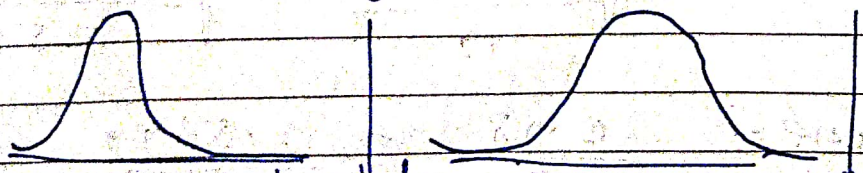


Fig:- Right skewed
Here
mean > median > mode

Fig:- Normal Distribution
Here
mean ≅ median ≅ mode

Fig:- left skewed
Here
mode > median > mean