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ROLL : 20I-0565

SECTION : SE (R)

SUBMITTED TO Mam AMMARA ALI

ASSIGNMENT # 01

QUESTION # 01

(a)

- No Gap between the bars.
- Area of every bar is $\propto$ to f that bar (class) has.

(b)

Using class boundries i.e, discrete data.

Height	Width	n (No of trees)	f density
4·9 – 9·5	5	14	2·8
9·5 – 12·5	3	18	6
12·5 – 15·5	3	15	5
15·5 – 18·5	3	4	1·33
18·5 – 28·5	10	8	0·8

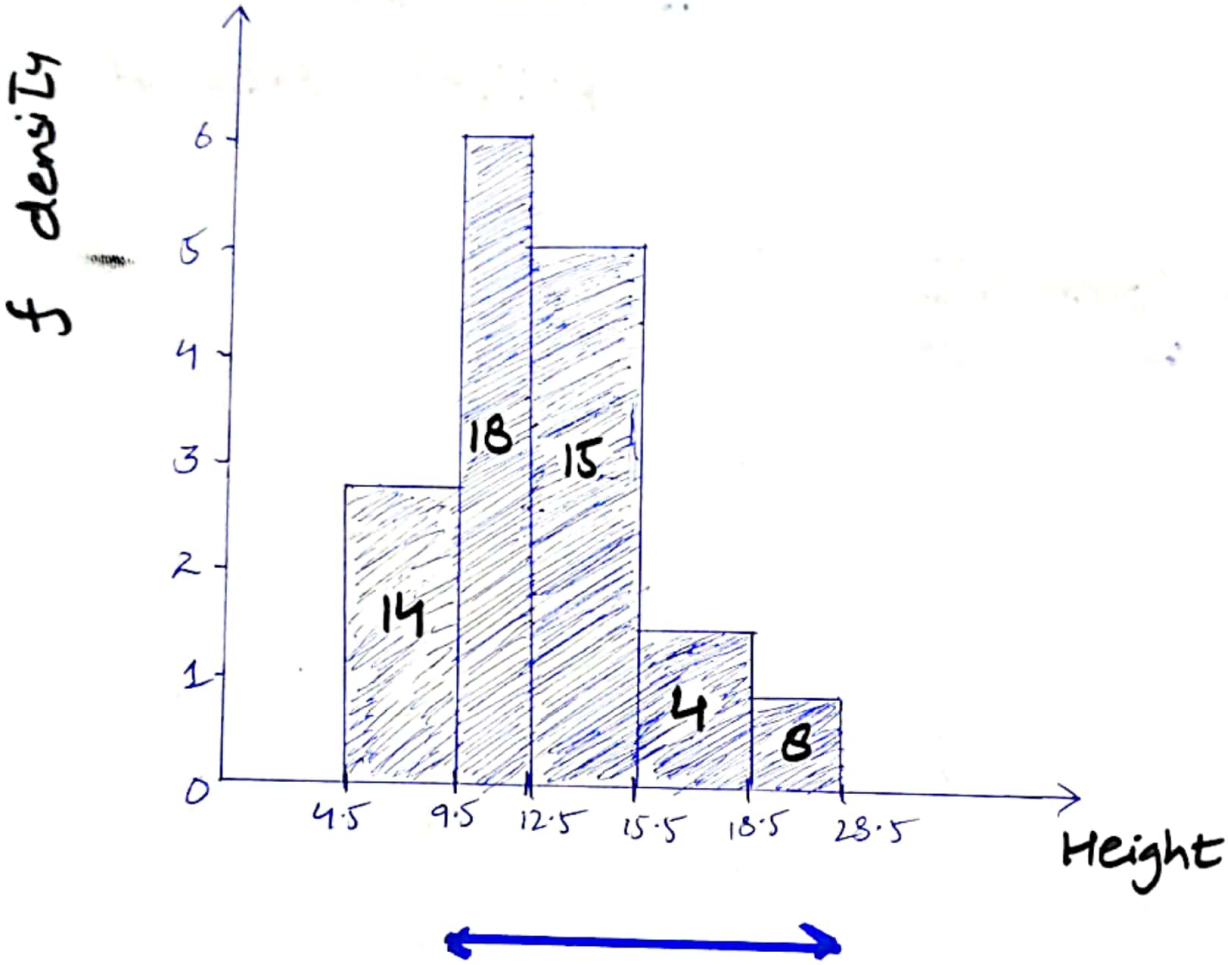
(c)

Height	Mid Value	f	fx
4·5 – 9·5	7	14	98
9·5 – 12·5	11	18	198
12·5 – 15·5	14	15	210
15·5 – 18·5	17	4	68
18·5 – 28·5	23·5	8	188

$\Sigma f = 58$ $\Sigma fx = 762$

$$\text{Mean} = \frac{\Sigma fx}{\Sigma f} = \frac{762}{58}$$

Mean = 13·1



QUESTION # 02

•) Math's Marks

$Q_1 = 46$

$Q_2 = 53$

$Q_3 = 60$

Hence, Distribution is Symmetrical

•) English Marks

$Q_1 = 35$

$Q_2 = 46$

$Q_3 = 60$

∴ Hence, Distribution is Positively skewed

•) Comments

Median Average Time of English Marks are slower then Math one's because of evenly distributed smaller range of math marks. They are more varying. That is why English has bigger spread of time, tively skewed.

QUESTION # 03

(a)

Mode = 2 (∵ Most occuring element)

Mid Range = $\frac{X_{max} + X_{min}}{2} \Rightarrow \frac{8+1}{2}$

Mid Range = 4.5

(b)

(i) Distribution of data is positive skewness

(ii) Vertical line graph fortifies discrete nature of variable.

(iii) Possible Outliers in Data sets.

(c)

$$\text{Mean} = \frac{\Sigma fx}{\Sigma f} = \frac{100}{50}$$

$$\bar{x} = 2$$

Hence, to find standard deviation we know,

$$S.D = \sqrt{\frac{\Sigma f x^2}{\Sigma f} - (\bar{x})^2}$$

$$= \sqrt{\frac{344}{50} - 4} \Rightarrow \sqrt{6.88 - 4}$$

$$S.D = 1.7$$

For outliers,

$$\bar{x} - 2(S.D) \quad \text{or} \quad \bar{x} + 2(S.D)$$

$$2 - 2(1.70) \quad \text{or} \quad \bar{x} + 2(1.70)$$

$$-1.40 \quad \text{or} \quad 5.40$$

values outside range of −1.40 and 5.40 for x are outliers, according to statement B is greater then 5.40.

Hence, B is an outlier.

(d)

- (A) Plotting of data is wrong as dice only have 6 Numbers hence, it is a **error**.
- (B) A family having 8 childrins is possible, so it **is possible or correct**

(e)

As, 8 occurs once,

$$\Sigma f' = \Sigma f - 1 = 49$$

$$\Sigma f_x' = \Sigma f_x - 8 = 92$$

$$\Sigma f_x^{2'} = \Sigma f_x^2 - 64 = 280$$

So,

$$\text{Mean} = \frac{\Sigma f_x'}{\Sigma f'} = \frac{92}{49}$$

$$\bar{x} = 1.877$$

$$\text{Standard Deviation} = \sqrt{\frac{\Sigma f x'^2}{\Sigma f'} - (\text{New Mean})^2}$$

$$= \sqrt{\frac{280}{49} - (1.877)^2}$$

$$S.D = 1.480.$$

QUESTION # 04

x	Mid Value	f	fx	fx^2
$0 < x \leq 10$	5	3	15	75
$10 < x \leq 20$	15	6	90	1350
$20 < x \leq 30$	25	9	225	5625
$30 < x \leq 40$	35	10	350	12250
$40 < x \leq 50$	45	12	540	24300
$50 < x \leq 60$	55	18	990	54450
$60 < x \leq 70$	65	14	910	59150
$70 < x \leq 80$	75	11	825	61875
$80 < x \leq 90$	85	5	425	36125
		$\Sigma f = 88$	$\Sigma fx = 4370$	

$$\Sigma f_x^2 = 255200$$

(a)

$$\text{Mean} = \frac{\Sigma fx}{\Sigma f} = \frac{4370}{88} = 49.65$$

$$S.D = \sqrt{\frac{\Sigma fx^2}{\Sigma f} - (\text{Mean})^2}$$

$$= \sqrt{\frac{255200}{88} - (49.65)^2}$$

$$S.D = 20.83$$

$$\text{Varience} = (S.D)^2$$

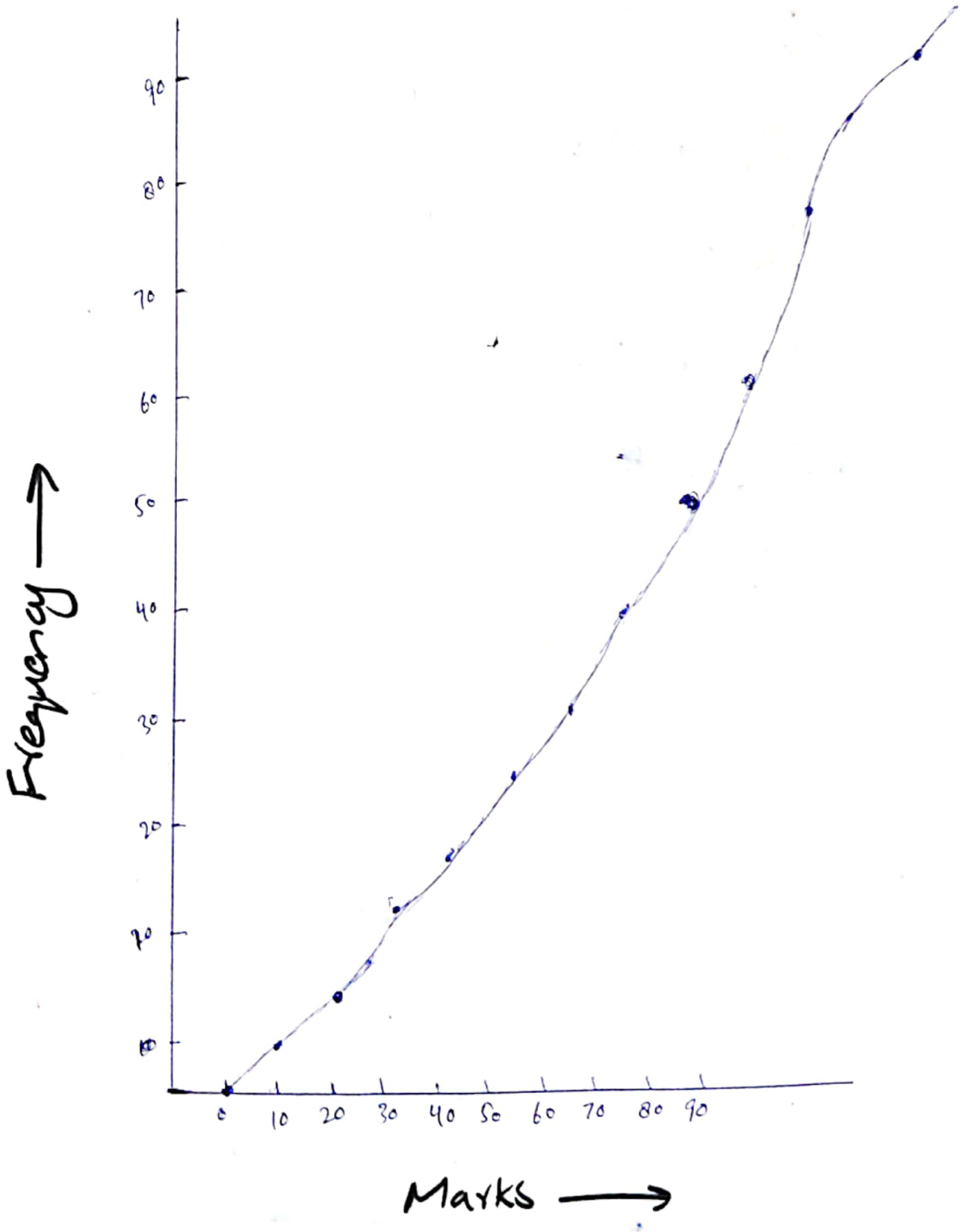
$$= (20.83)(20.83)$$

$$\text{Varience} = 433.88$$

(b)

Marks	C.f
$x \leq 10$	3
$x \leq 20$	9
$x \leq 30$	18
$x \leq 40$	28
$x \leq 50$	40
$x \leq 60$	58
$x \leq 70$	72
$x \leq 80$	83
$x \leq 90$	88

(c)
Commulative Frequency Polygon



(d)

Median = $\frac{1}{2}(88)^{th} \Rightarrow 44^{th}$ value

so from Graph, Estimated value is: 52.

$Q_1 = \frac{n}{4^{th}} = \frac{88}{4} = 22^{th}$ value.

$Q_1 = 32$

$Q_3 = \frac{3}{4}(88)^{th}$ value $= 66^{th}$ value

$Q_3 = 64$

Inter Quartile Range $= Q_3 - Q_1 = 64 - 32$

$= 32$

(e)

According to Commultative f graph,

The point moves from x-axis (75) to y-axis with polygon to reach value (77).

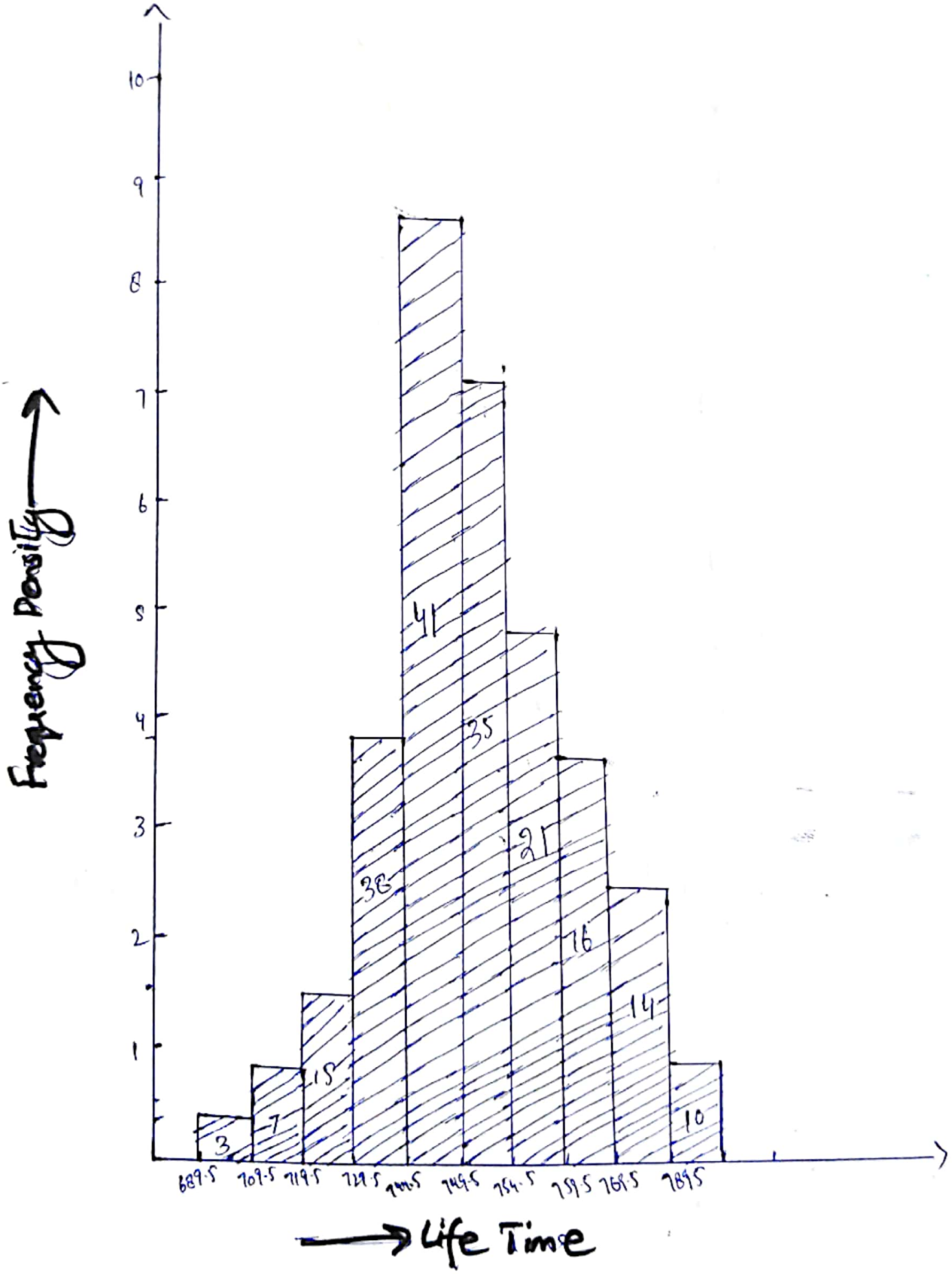
C.f = Highest Point - Reached Point.

$= 88 - 77$

$= 11$. ∴ 11 students get A grade.

QUESTION # 05

(2)

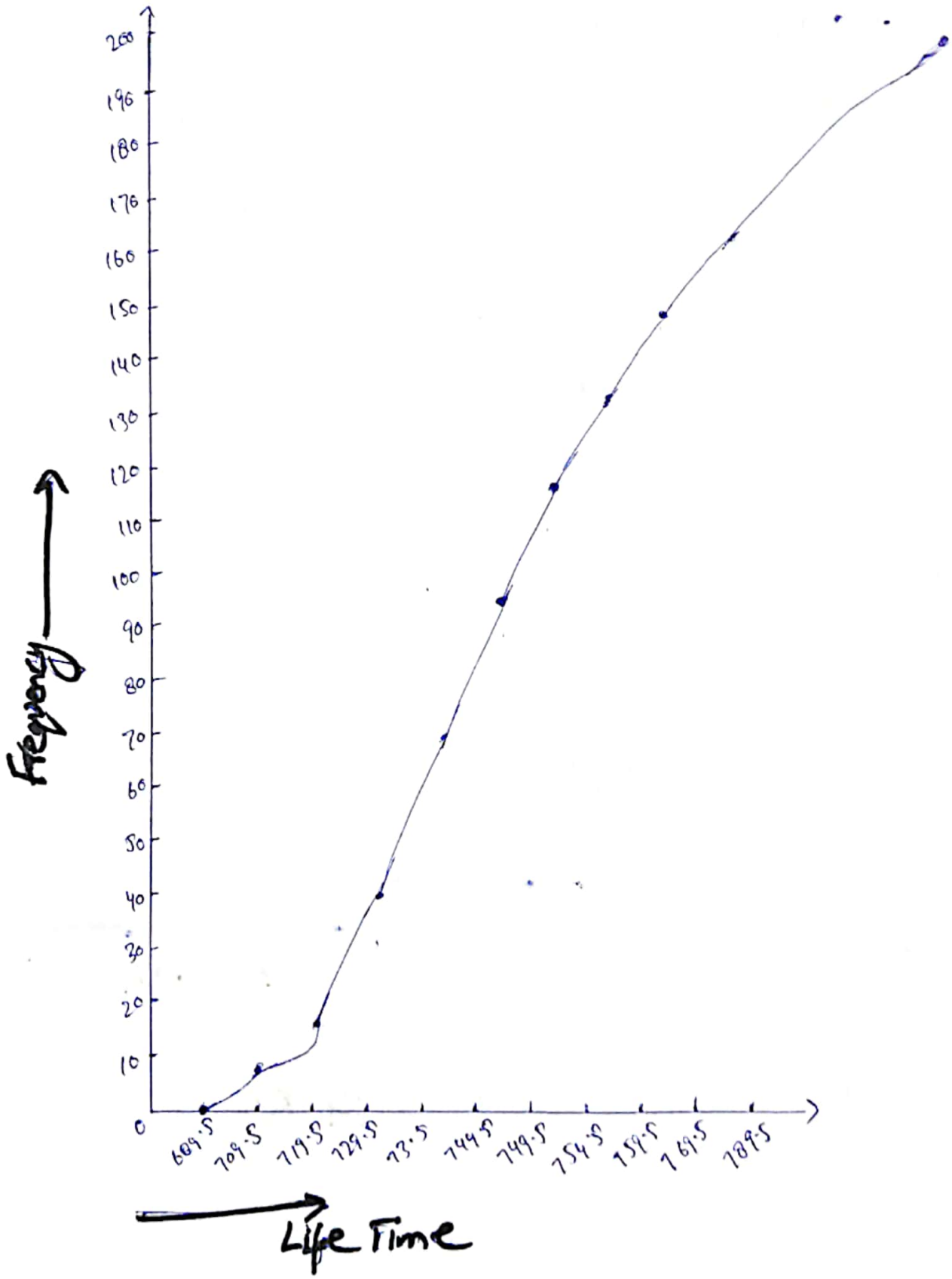


(b)

Life Time	f
≤ 689.5	0
≤ 709.5	3
≤ 719.5	10
≤ 729.5	25
≤ 739.5	63
≤ 744.5	104
≤ 749.5	139
≤ 754.5	160
≤ 759.5	176
≤ 769.5	190
≤ 789.5	200

Graph is on next page of Commultative frequency polygon. AJ

Commulative f Polygon



(c)

Life Time	Mid Value	f	fx	fx^2
689.5 – 709.5	699.5	3	2098.5	1467900.75
709.5 – 719.5	714.5	7	5001.5	3573571.75
719.5 – 729.5	724.5	15	10867.5	7873503.75
729.5 – 739.5	734.5	38	27911	20500629.5
739.5 – 744.5	742	41	30422	22573124
744.5 – 749.5	747	35	26145	19530315
749.5 – 754.5	752	21	15792	11875584
754.5 – 759.5	757	16	12112	9168784
759.5 – 769.5	764.5	14	10703	8182443.5
769.5 – 789.5	779.5	10	7795	6076202.5
		$\Sigma f = 200$	$\Sigma fx = 148838.5$	$\Sigma fx^2 = 110822058.8$

$$\text{Mean} = \frac{\Sigma fx}{\Sigma f} = \frac{148838.5}{200} = 744.24$$

$$\text{Standard Deviation} = \sqrt{\frac{\Sigma fx^2}{\Sigma f} - (\bar{x})^2} = 14.83$$

(d)

Median $= \frac{200}{2} = 100^{th}$ value ≈ 744.02

Q_1 : $\frac{n}{4} \Rightarrow \frac{200}{4} \Rightarrow 50^{th}$ value ≈ 736.08

Q_3 : $\frac{3n}{4} \Rightarrow \frac{3(200)}{4} \Rightarrow 150^{th}$ value ≈ 752.12

(e)

$$\text{Pearson's Coefficient of skewness} = \frac{3(\text{Mean} - \text{Median})}{\text{S.D}}$$

$$= \frac{3(744.24 - 744.02)}{14.83}$$

$$\Rightarrow 0.0446$$

(f)

$$\text{Quartile co-efficient of skewness} = \frac{(Q_3 - Q_2) - (Q_2 - Q_1)}{Q_3 - Q_1}$$

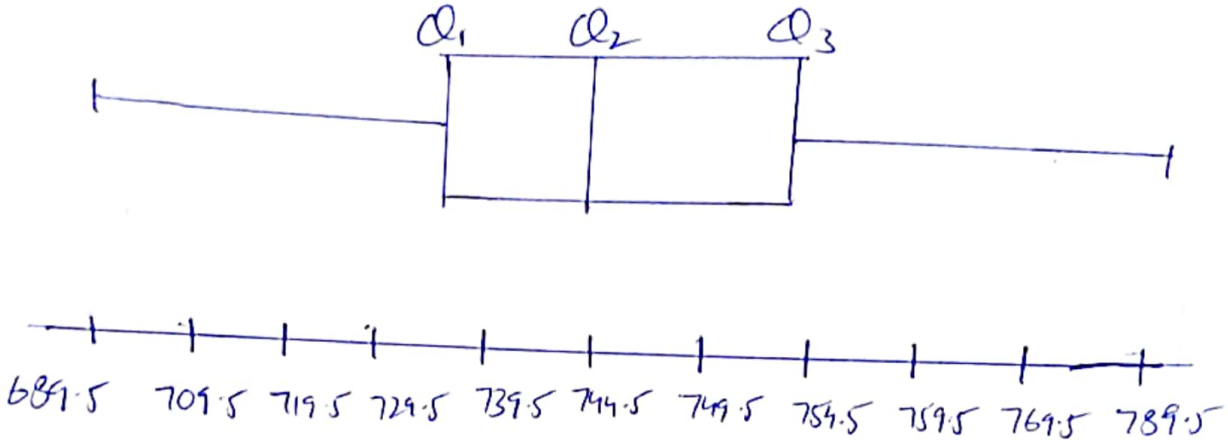
$$= \frac{Q_3 - 2Q_2 + Q_1}{Q_3 - Q_1}$$

$$= \frac{752.12 - 2(744.24) + 736.08}{752.12 - 736.08}$$

$$\Rightarrow 0.017$$

(g)

Box & Whisker Diagram



QUESTION # 06

Before		After
8	4	
7 3 1 1 0	5	
9 9 6 6 4	6	9
9 5 3 3 0 0	7	0 5 5 7 7
1	8	0 0 1 4 4 6
3 3 3 3 1 0 0	9	5 6 7
5 5	10	4 4 4 6 8 9
1 1 0	11	7
	12	5
	13	0 0 1 7 7
	14	3 5

Median = $\frac{30+1}{2}$ = 15.5 th value

Median = $\frac{73+75}{2}$ = 74

$Q_1 = \frac{15+1}{2}$ = 8 th value

Q_1 = 66

Q_3 = 23 th Value = 93

Inter Quartile = $Q_3 - Q_1$

Range = 93 − 66

= 27

Median = 15.5 th value

Median = $\frac{97+104}{2}$ = 100.5

Q_1 = 8 th value

Q_1 = 80

Q_3 = 23 th Value = 117

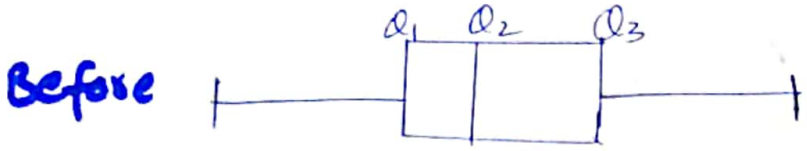
Inter Quartile = $Q_3 - Q_1$

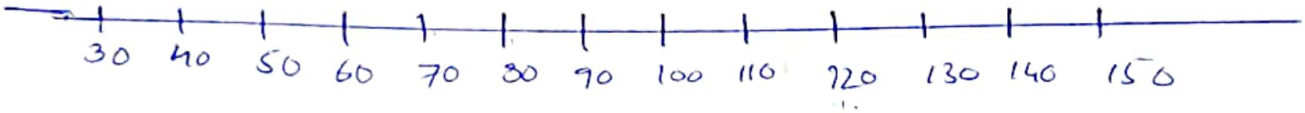
Range = 117 − 80

= 37

(b)

Box & Whisker Graph :





(c)

Before :

Inter Quartile Range = 27

$Q_1 - 1.5(27)$, $Q_3 + 1.5(27)$

$66 - 1.5(27)$, $93 + 1.5(27)$

25.5 , 133.5

After :

Inter Quartile Range = 37

$Q_1 - 1.5(37)$, $Q_3 + 1.5(37)$

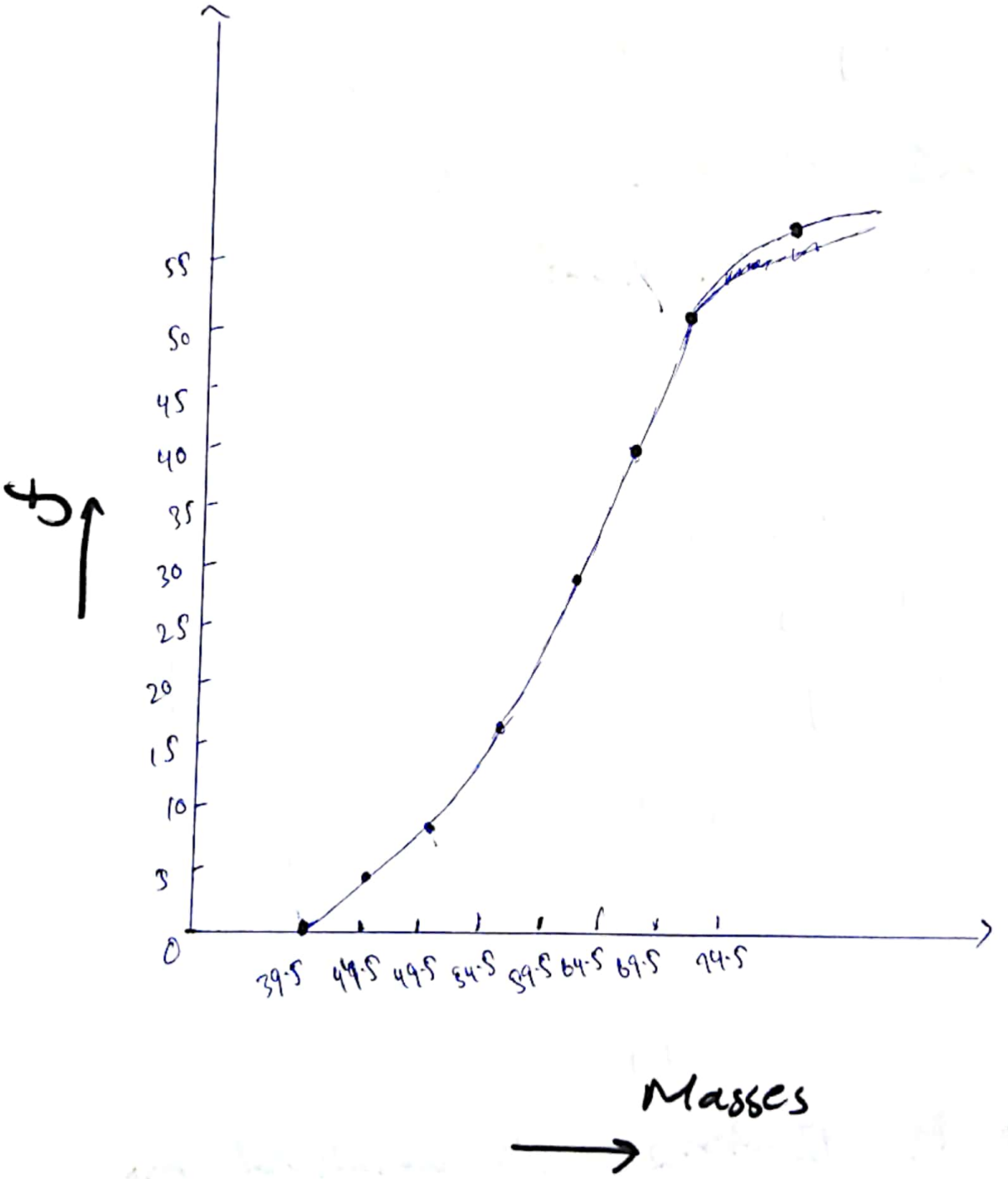
$80 - 1.5(37)$, $117 + (37)1.5$

24.5 , 172.5

All values are in range of calculated limit of outliers, hence no outliers.

QUESTION # 07

(a)



(b)

From the Graph,

Marked class below 57 on x-axis, & moving towards y-axis,

⇒ 21 students are less weighted

(c)

From Graph,

Marked 61 on x-axis & moving towards y-axis to reach 38,

⇒ Heighest value − Reached value

52 − 38

⇒ 14

⇒ 14 students are weighted more.

(d)

According to statment, 80% data is below x, 80th Percentile is,

$$P_{80} = \frac{8}{10}(52)$$

$$= 41.6$$

From Graph, $x = 62$ kg.

(e)

$$\text{Median} = \frac{52}{2} = 26^{th} \text{ value.}$$

From Graph, Median = 58 kg.

(f)

Q_1 : $\frac{n}{4} \Rightarrow \frac{52}{4} \Rightarrow 13^{th}$ value

$Q_1 = 55.02$

Q_3 : $\frac{3n}{4} \Rightarrow \frac{3(52)}{4} \Rightarrow 39^{th}$ value

$Q_3 = 62.2$

Inter Quartile Range $= Q_3 - Q_1$

$= 62.2 - 55.02$

$\Rightarrow 7.18$

QUESTION # 08

(a)

B : Symmetrical Distribution

(b)

A : Positively Skewed

(c)

C : Negatively Skewed