

NAME Syed Taimoor Shah
 ID 14832
 Department BS CS 4th
 Subject Probability and
 Statistics

Question 1

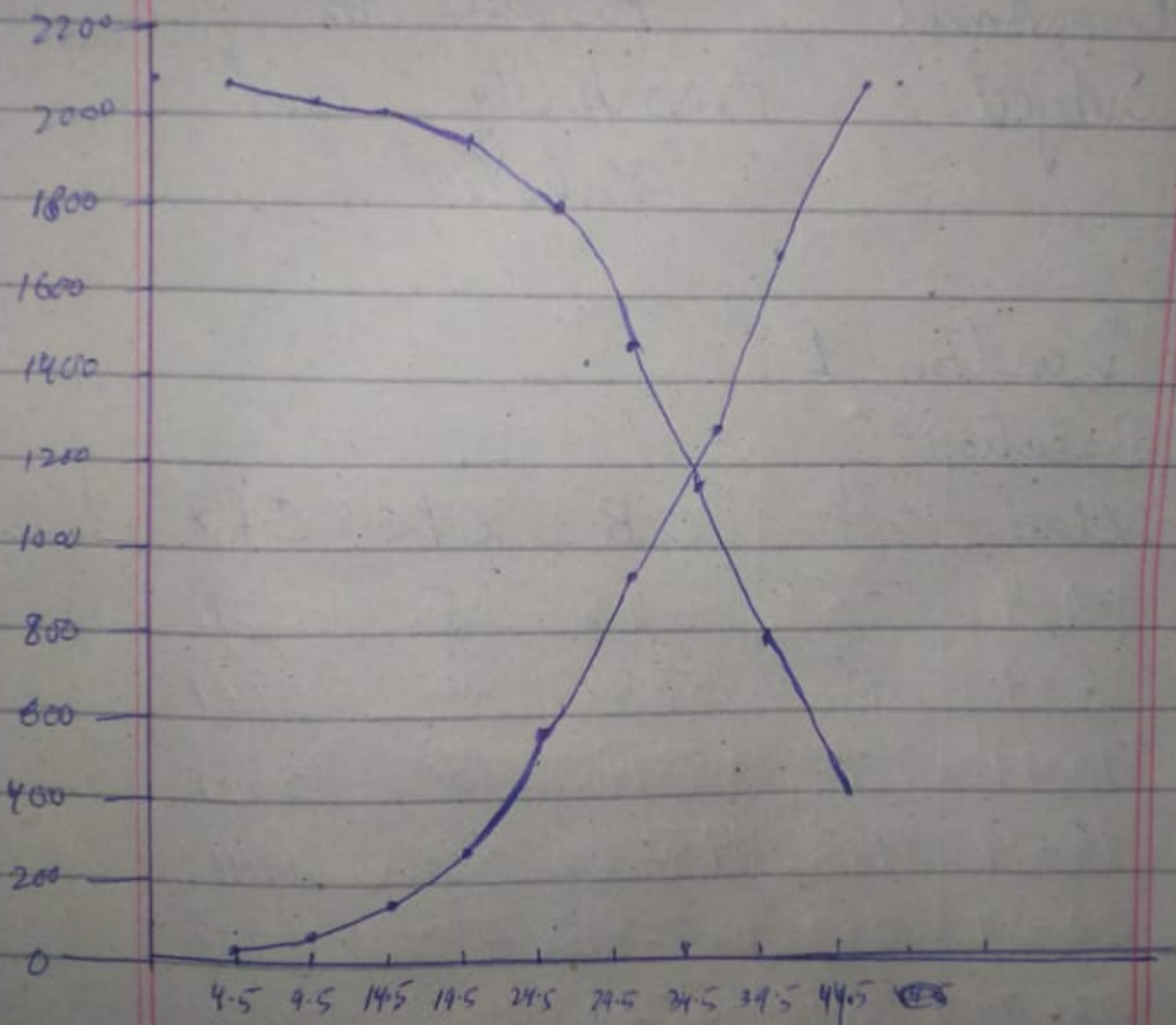
Solution:

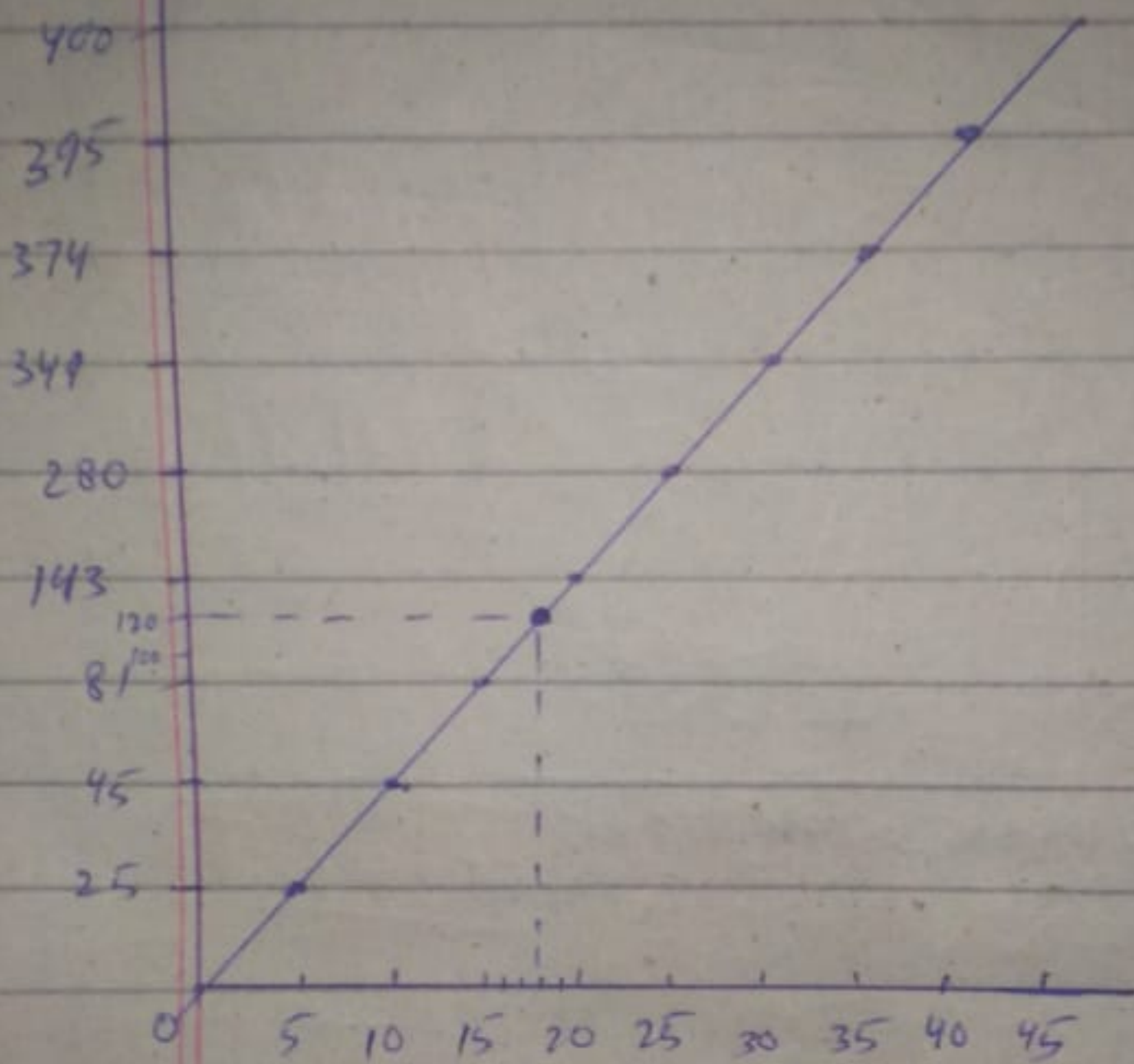
(a)	Class	f	C.B	C.f <	C.f >
	0-4	25	4.5	25	2092
	5-9	45	4.5 - 9.5	70	2067
	10-14	81	9.5 - 14.5	151	2022
	15-19	143	14.5 - 19.5	294	1941
	20-24	280	19.5 - 24.5	574	1798
	25-29	349	24.5 - 29.5	923	1518
	30-34	374	29.5 - 34.5	1297	1169
	35-39	395	34.5 - 39.5	1692	795
	40-44	400	39.5 - 44.5	2092	400

$C.B = \Delta = \frac{LCL \text{ of 2nd class} - UCL \text{ of first class}}{2}$

$$C.B = \frac{5 - 4}{2}$$

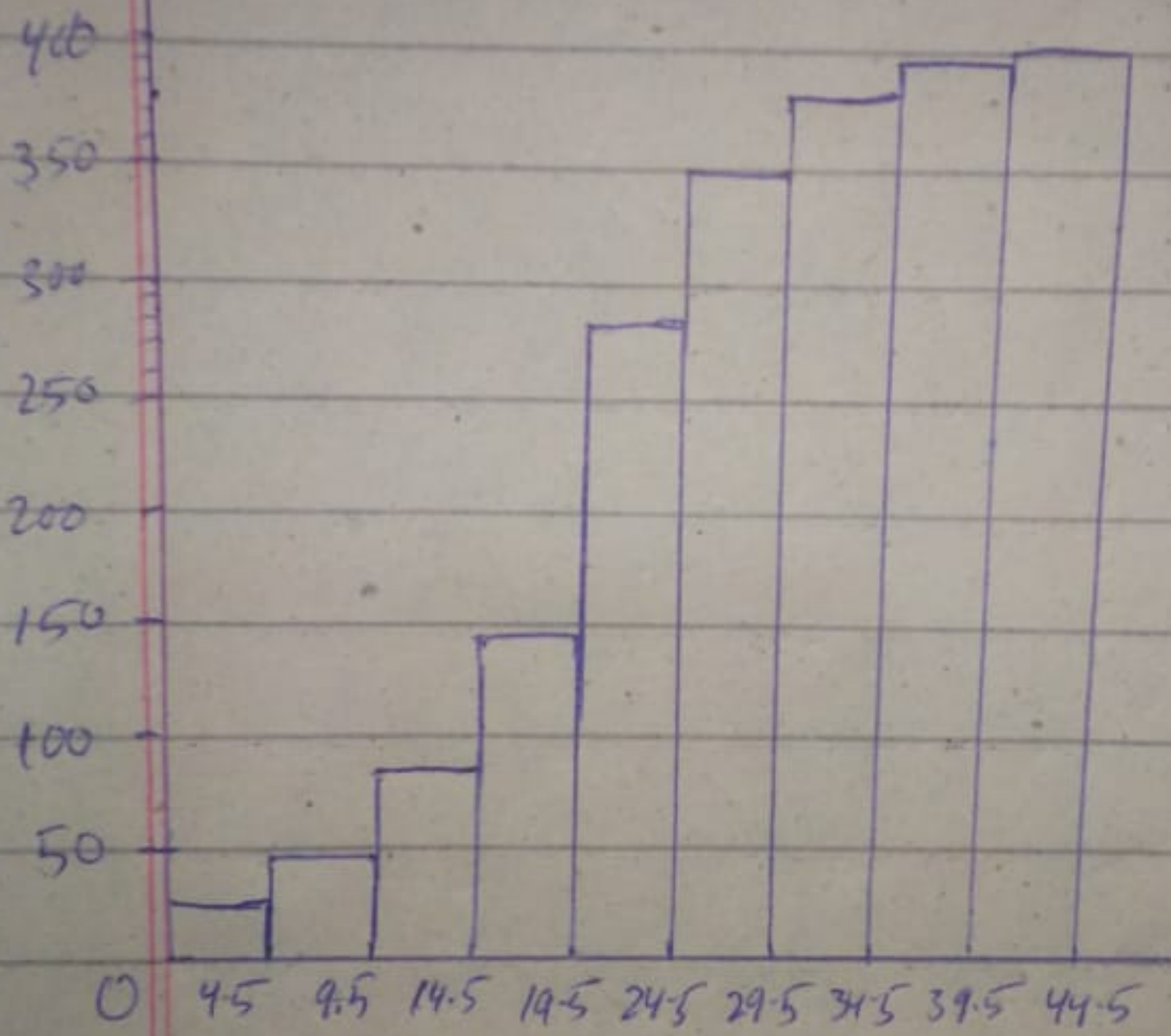
$$C.B = \frac{1}{2} = 0.5$$





This Graph shows around
120 students take less than
18 minutes

(b)



Question 2

Solution:-

$$N = 30$$

$$X_m = 431$$

$$X_0 = 363$$

Range:

$$R = X_m - X_0$$

$$R = 431 - 363$$

$$R = 68$$

No of Classes:

$$K = 1 + 3.33 \log(N)$$

$$K = 1 + 3.33 \log(30)$$

$$K = 1 + 3.33 (1.47)$$

$$K = 5.92$$

$$K \approx 6$$

$$h = R/K$$

$$\frac{68}{6}$$

$$h \approx 12$$

Classes	f	C.B	x	C.f.c	Tally
363-374	4	362.5-374.5	368.5	4	IIII
375-386	4	374.5-386.5	380.5	8	IIII
387-398	8	386.5-398.5	392.5	16	IIII III
399-410	7	398.5-410.5	404.5	23	IIII II
411-422	4	410.5-422.5	416.5	27	IIII
423-434	3	422.5-434.5	428.5	30	III

Mean:

$$\bar{x} = \frac{\sum f_i \cdot x_i}{n}$$

$$\bar{x} = \frac{11919}{30}$$

$$\bar{x} = 397.3$$

Mode:

$$M = l_1 + \frac{f_1 - f_0}{2 \cdot f_1 - f_0 - f_2} (l_2 - l_1)$$

$$M = 386.5 + \frac{8-4}{2(8)-4-7} \cdot (398.5-386.5)$$

$$M = 386.5 + \frac{4}{16-11} (12)$$

$$M = 386.5 + \frac{4}{5} (12)$$

$$M = 386.5 + 9.6$$

$$M = 396.1$$

Quartiles:

$$q_1 = \frac{n}{4}$$

$$q_1 = \frac{30}{4} = 7.5$$

$$Q_1 = l + \frac{h}{f} (q_1 - c)$$

$$Q_1 = 374.5 + \frac{12}{4} (7.5 - 4)$$

$$Q_1 = 374.5 + 3 (3.5)$$

$$= 374.5 + 10.5$$

$$Q_1 = 385$$

$$q_3 = \frac{3n}{4}$$

$$q_3 = \frac{3(30)}{4}$$

$$q_3 = \frac{90}{4} = 22.5$$

$$Q_3 = l + \frac{h}{f} (q_3 - c)$$

$$Q_3 = 398.5 + \frac{12}{7} (22.5 - 16)$$

$$= 398.5 + \frac{12}{7} (6.5)$$

$$Q_3 = 398.5 + 11.14$$

$$Q_3 = 409.64$$

Question 3

First Set:

3, 6, 2, 1, 7, 5

$$\text{Mean} = \frac{\text{sum of all No}}{\text{Total No}}$$

$$M = \frac{24}{6} = 4$$

$$S.D = \sqrt{\frac{\sum x_i^2}{N} - \left(\frac{\sum x_i}{N}\right)^2}$$

x	x^2
3	9

$$S.D = \sqrt{\frac{124}{6} - \frac{576}{36}}$$

6	36
2	4

$$= \sqrt{\frac{744 - 576}{36}}$$

1	1
7	49
5	25

$$= \sqrt{\frac{168}{36}}$$

24	124
----	-----

$$S.D \approx 4.67 = \boxed{2.16}$$

2nd Set:

11, 17, 9, 7, 19, 15

$$\text{Mean} = \frac{78}{6} = 13$$

$$S.D = \sqrt{\frac{\sum x_i^2}{N} - \left(\frac{\sum x_i}{N}\right)^2}$$

$$S.D = \sqrt{\frac{1126}{6} - \frac{6084}{36}}$$

$$S.D = \sqrt{\frac{5756 - 6084}{36}}$$

$$= \sqrt{\frac{672}{36}}$$

x	x^2
11	121
17	289
9	81
7	49
19	361
15	225
<u>78</u>	<u>1126</u>

$$S.D = \sqrt{18.67}$$

$$S.D = 4.32$$

Mean of 1st set = 4

S.D of 1st set = 2.16

2nd set Mean = 13

S.D of 2nd Set = 4.32

Relation:-

Mean and S.D of 2nd Set are greater than 1st set.

Question 4:-

Class	f	x	x^2	fx	fx^2
64-84	15	74	5476	1110	82140
85-104	18	94.5	8930.25	1701	160744.5
105-124	27	114.5	13110.25	3091.5	353976.5
125-144	10	134.5	18090.25	1345	180902.5
145-164	6	154.5	23870.25	927	143221.5
165-184	5	174.5	30450.25	872.5	152251.25
185-204	13	194.5	37830.25	2528.5	491743.25
	94			11575.5	1565029.75

$$V \sigma^2 = \frac{\sum fx^2}{n} - \left(\frac{\sum fx}{n} \right)^2$$

$$V \sigma^2 = \frac{1565029.75}{94} - \left(\frac{11575.5}{94} \right)^2$$

$$V \sigma^2 = 16649.25 - 15164.35$$

$$V = 1484.9$$

S.D can be found by
taking square root of
Variance.

$$\text{S.D} = \sqrt{V}$$

$$\text{S.D} = \sqrt{1484.9}$$

$$\text{S.D} = 38.53$$

Ans

Question 5

(a) River:-

I think, if height of a person is 5 feet and average depth of river is also 5 feet so he can not cross it as he will be in water from head to toe not able to breathe or see. if it is not the case then.

No, if average depth of river is 5 feet then it is not obvious that all the people of height 5 feet can cross it. The important fact is that

a river of average depth
of 5 feet is not
deep uniformly. It is
2 feet at some
point while 7 feet
at other point. So the
5 feet person can
drown when he goes
to part of river that
is 6 or 7 feet
deep

b) No, It does not mean every student is hopeless. There would be students whose marks are less than 30 while there can be few students whose marks might be 60 or more. So from average marks we can not say every student is hopeless.

(c) No, it is not like that. Average pay does not mean everyone get paid same. The King's income will be much more than the servants.