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(1)

BSCCS) Syed Danish Ali I.D=14712.M.Daud Sir

Probability and Statistics

(Q.1)
(Solution)
(a)

Class interval	Frequency	Class Boundaries	C.f <	C.f >
0-4	25	0-4.5	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	1189
35-39	395	34.5-39.5	1692	795
40-44	400	39.5-44.5	2092	400

C.B = Δ = LCL of 2nd class - UCL of 1st class

$$C.B = 5 - 4$$

$$C.B = 1$$

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

$$C.B = 0.5$$

(2)

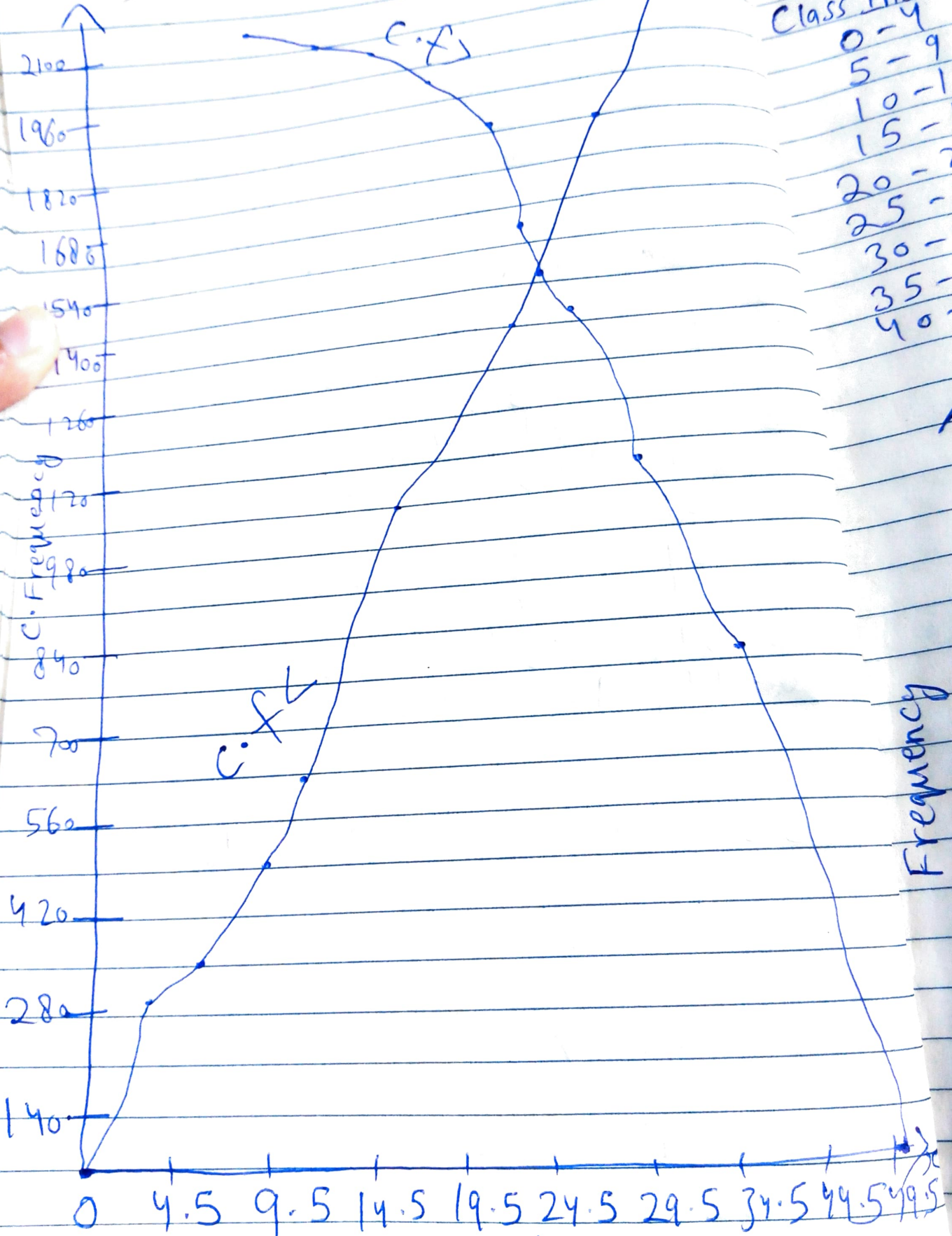
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Syed Danish Ali Q.1 (Ans)

Class Interval
0-4
5-9
10-14
15-19
20-24
25-29
30-34
35-39
40-44



Frequency

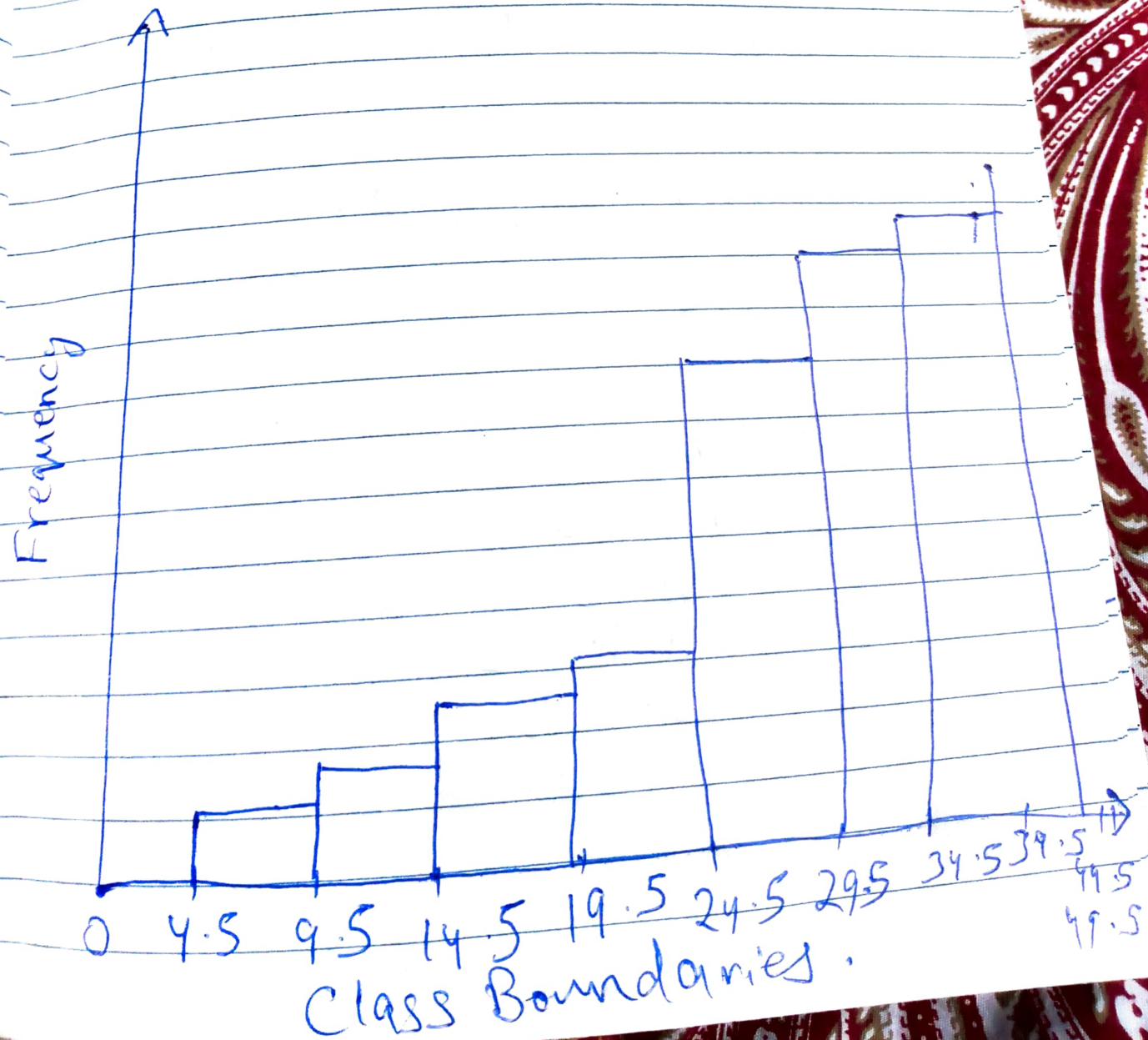
Class Boundaries.

14712

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Q.1 (Ans) (b)

Class Interval	Frequency	Class Boundaries
0-4	25	-0.5-4.5
5-9	45	4.5-9.5
10-14	81	9.5-14.5
15-19	143	14.5-19.5
20-24	280	19.5-24.5
25-29	349	24.5-29.5
30-34	377	29.5-34.5
35-39	395	34.5-39.5
40-44	400	39.5-44.5



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(Q.2)
(Answer)

Group Distribution Table:-

Step 1:-

Count the number of observations; $N = 30$

Step 2:-

Largest value: $X_m = 431$
Smallest value: $X_0 = 363$

Step 3:-

Rang; $R = X_m - X_0$
 $= 431 - 363$
 $= 68$

Step 4:-

$K = 1 + 3.33 \log N$
 $K = 1 + 3.33 \log (30)$
 $K = 1 + 3.33 (1.477)$
 $K = 1 + 4.92$
 $K = 5.92$
 $K = 6$ (rounding off)

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Step 5:-

$$h = R/k$$

$$h = 68/6$$

$$h = 11.33$$

$$h = 12 \text{ (by rounding)}$$

Classes	Frequency (f)
363-374	4
375-386	4
387-398	8
399-410	7
411-422	4
423-434	3

By Tally Column

Classes	Class Boundaries	Class Mark	Frequency (f)	C.f	Tally
363-374	362.5-374.5	368.5	4	4	
375-386	374.5-386.5	380.5	4	8	
387-398	386.5-398.5	392.5	8	16	
399-410	398.5-410.5	404.5	7	23	
411-422	410.5-422.5	416.5	4	27	
423-434	422.5-434.5	428.5	3	30	

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Mean:-

$$\begin{aligned} \bar{x} = & 423 + 369 + 387 + 411 + 393 + 394 \\ & 371 + 377 + 389 + 409 + 392 \\ & 408 + 431 + 401 + 363 + 391 + \\ & 405 + 382 + 400 + 381 + 399 \\ & + 415 + 428 + 422 + 396 + \\ & 372 + 410 + 419 + 386 + 390 \\ & \underline{\hspace{10em}} \\ & 30 \end{aligned}$$

$$\bar{x} = \frac{11914}{30}$$

$$\bar{x} = 397$$

Mode:-

$$\text{Mode} = l + \frac{f_m - f_1}{(f_m - f_1) + (f_m - f_2)} \times h$$

Here $l = 387$, $f_m = 8$, $f_1 = 4$

$f_2 = 7$, $h = 12$.

712.

$393 + 394 +$
 $409 + 392 +$
 $63 + 391 +$
 $381 + 399 +$
 $398 +$
 $388 + 390$

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So,

$$\text{Mode} = 387 + \frac{8-7}{(8-7)+(8-7)} \times 12$$

$$\text{Mode} = 387 + \frac{1}{1+1} \times 12$$

$$\text{Mode} = 387 + \frac{1}{2} \times 12$$

$$\text{Mode} = 387 + \frac{6}{2}$$

$$\text{Mode} = 387 + \frac{12}{2}$$

$$\text{Mode} = 387 + 6$$

$$\text{Mode} = 393$$

$$\text{Mode} = 399$$

xh

Quartiles:-

$$Q_1 = \frac{n}{4} = \frac{30}{4}$$

$$Q_1 = 7.5$$

which corresponds to value in class.

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375 - 386, Therefore

$$Q_1 = l + \frac{h}{f} \left(\frac{n}{4} - c \right)$$

$$Q_1 = 375 + \frac{12}{4} (9.5 - 4) \quad \because c = 4$$

$$Q_1 = 375 + 3(3.5)$$

$$Q_1 = 375 + 10.5$$

$$Q_1 = 385.5$$

$$Q_1 = 386$$

Now

$$Q_3 = \frac{3n}{4} = \frac{3 \times 30}{4}$$

$$Q_3 = \frac{90}{4} = 22.5$$

which corresponds to value in class 399 - 410. Therefore

$$Q_3 = l + \frac{h}{f} \left(\frac{3n}{4} - c \right)$$

$$Q_3 = 399 + \frac{12}{7} (22.5 - 16) \quad \because c = 16$$

$$Q_3 = 399 + \frac{7 \cdot 12}{7} (6.5) \quad Q_3 = 399 + 7 \cdot 9.20 \quad Q_3 = 410$$

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(2.4)
(Answer)

Classes	f _i	x	x ²	fix	fix 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	353976.75
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	491793.25
	<u>Σ = 94</u>		<u>25</u>	<u>Σ = 11575.5</u>	<u>Σ = 1565029.75</u>

Variance:-

$$S^2 = \frac{\sum fix x^2}{n} - \left(\frac{\sum fix}{n} \right)^2$$

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

$$S^2 = 16649.26 - 15164.35$$

$$S^2 = 1484.9$$

$$S^2 = 1485$$

in

= 16

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• Standard Deviation:

Taking square root of eq(1)
we have

$$\sqrt{S^2} = \sqrt{1485}$$

$$S = 38.5$$

(Q.3)
(Answer)• First data:-

3, 6, 2, 3, 7, 5

$$\text{Mean} = \frac{3+6+2+3+7+5}{6}$$

$$\text{Mean} = \frac{24}{6}$$

$$\text{Mean} = 4$$

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x	x ²
3	9
6	36
2	4
1	1
7	49
5	25
$\Sigma = 24$	$\Sigma = 124$

$$S \cdot \text{Derivation} = \sqrt{\frac{\Sigma x^2}{N} - \left(\frac{\Sigma x}{N}\right)^2}$$

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

$$S \cdot D = \sqrt{\frac{744 - 576}{36}}$$

$$S \cdot D = \sqrt{\frac{168}{36}}$$

$$S \cdot D = \sqrt{4.7}$$

$$S \cdot D = 2.2$$

• Second Data:-

= 11, 17, 9, 9, 19, 15

$$\text{Mean} = \frac{11 + 17 + 9 + 9 + 19 + 15}{6}$$

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

$$\text{Mean} = 13$$

$$S \cdot \text{Derivation} = \sqrt{\frac{\Sigma x^2}{N} - \left(\frac{\Sigma x}{N}\right)^2}$$

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cs) Syed Danish

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x	x^2	$S.D = \sqrt{\frac{1126}{6} - \frac{6084}{36}}$
11	121	
17	289	$S.D = \sqrt{\frac{6756}{36} - \frac{6084}{36}}$
9	81	
9	49	
19	361	$S.D = \sqrt{\frac{672}{36}}$
15	225	
$\rightarrow 98$	$\Sigma = 11$ 26	$S.D = \sqrt{18.7}$

$$S.D = 4.3$$

1st data Mean = 41st data S.D = 222nd data Mean = 172nd data S.D = 4.3

The required relation is that

\rightarrow Mean of 2nd data is greater than mean of 1st data and standard deviation of 2nd data is double the standard deviation of 1st data.

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Q.5

(a)

(Ans)

• Comment:-

= No, it is not obviously that all the people have height 5 feet can easily cross it. if he did not know swimming and river is not deep uniformly. It is 2 feet at some points while 7 feet on other points, so he will cross it.

Q.5

(b)

(Ans)

• Comment:-

= No, it does not mean every student is hopeless. Those students whose marks are less than 30. Some have 30 marks and some students have greater than 30 marks. There can be few students whose marks may be 60 or more.

(Q. 5)

(c)

(Ans).

• Comment:-
= No, it is not true, that all the household servants must be paid. Average pay does not mean everyone get paid same. The king income will be much more than servants.

THE END