Probability and Statistics:

Q NO1:-

Ans:

Class interior	Freq	class Boundaries	cf <	cf>
0-4	25	0-45	25	2092
5-9	45	45-95	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	775
40-44	400	39·5-44·5	2092	402

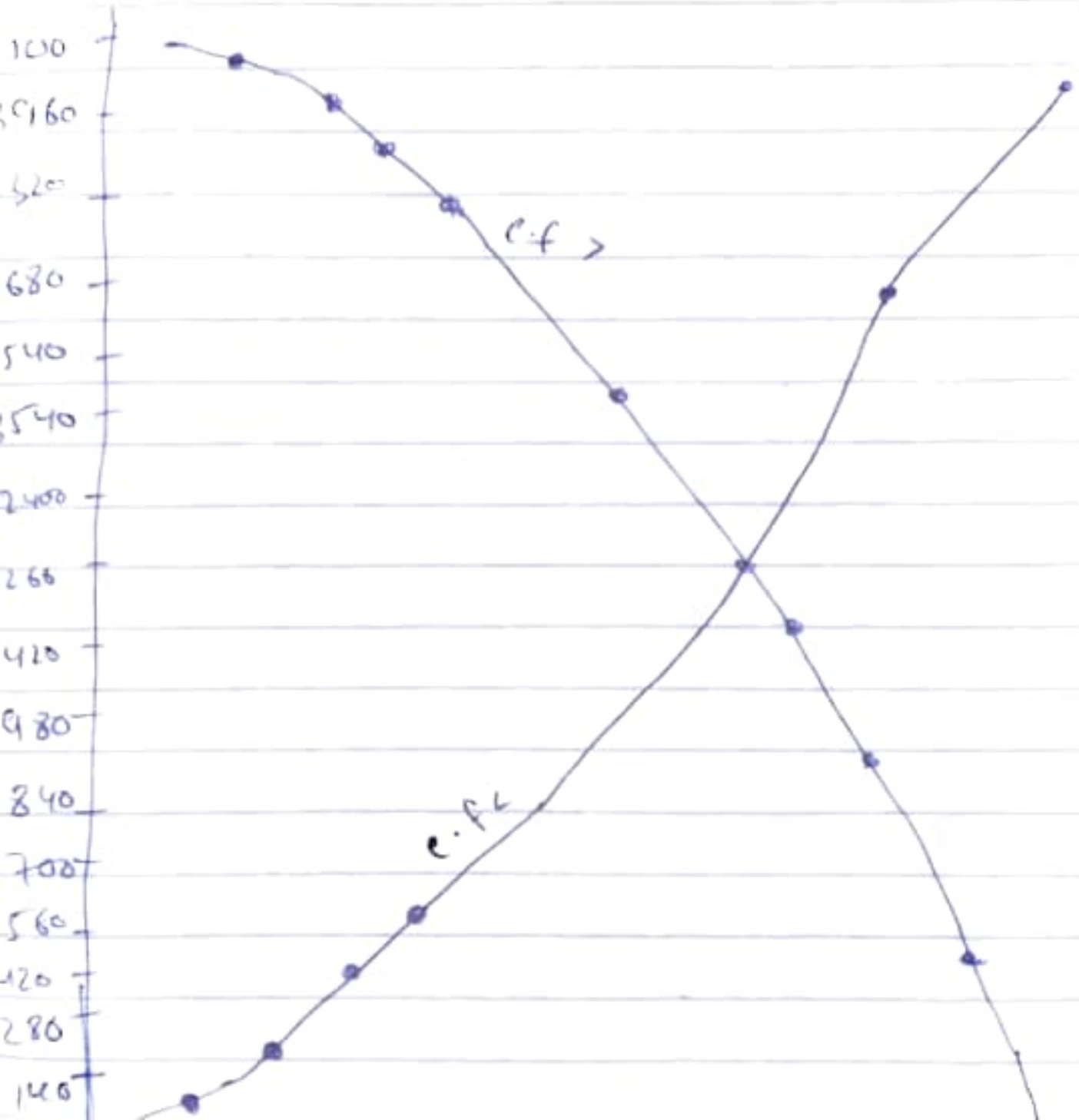
C.B = Δ = LCL of 2nd class - UCL of 1st class

C.B = 5 - 4

C.B = 1

C.B = Δ/2 = 1/2

C.B = 0.5


1000
5160
520
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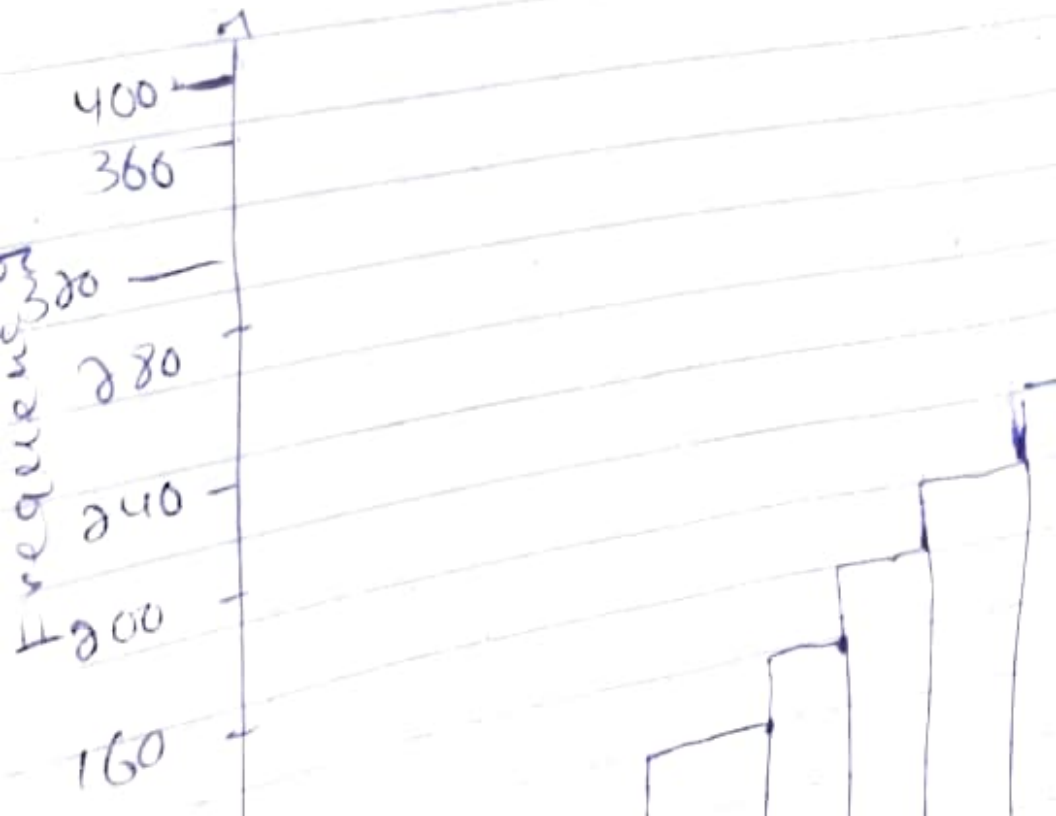
5540
2400
266
420
980
840
700
560
420
280
140
e.f >
e.f <

NO 1:

Ans (b).

Class Interval	Freq	c
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	374	29.5 - 34.5
35 - 39	395	34.5 - 39.5
40 - 44	400	39.5 - 44.5



Noo:

Group Distribution Table:-

Step 1:

Count the number of observatio

; N = 30

Step 2:-

Largest value ; $x_n = 431$

Smallest value $x_0 = 363$.

Step 3#

Range ; $R = x_n - x_0$

$= 431 - 363$

$= 68$.

Step 4#

$k = 1 + 3.33 \log N$

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

$k = 1 + 3.33 (1.477)$

$k = 5.92$

$k = 6$ (rounding off).

Step 5#

$h = R/k$

$h = 68/6$

$h = 11.33$

$h = 12$ (by rounding)

(5)

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Classes	Frequency
383 374	4
375 - 386	4
387 - 398	8
399 - 410	7
411 - 420	4
423 - 434	3

By Tally column

classes	class Boundaries	class Mark	(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	36	|||

Mean:

$$\bar{x} = \frac{423 + 369 + 387 + 411 + 393 + 394 + 371 + 377 + 389 + 409 + 392 + 408 + 431 + 401 + 363 + 391 + 405 + 382 + 400 + 381 + 399 + 411 + 428 + 422 + 396 + 372 + 410 + 419 + 386 + 390}{30}$$

$\bar{x} = 11914/30$

$\bar{x} =$ [illegible]

Mode:

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

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

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

So

$$\text{Mode} = 387 + \frac{8-4}{(8-4)+(8-7)} + 12$$

$$\text{Mode} = 387 + \frac{4}{4+1} + 12$$

$$\text{Mode} = 387 + \frac{4}{5} + 12$$

$$\text{Mode} = 387 + \frac{48}{5}$$

$$\text{Mode} = 3966$$

$$\text{Mode} = 397$$

Quartiles:

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

$$Q_1 = 7.5$$

which corresponds to value in class 375-386. Therefore.

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

$Q_1 = 375 + \frac{12}{4}(7.5 - 4)$ $\because c = 4$

$Q_1 = 375 + 3(3.5)$

$Q_1 = 375 + 10.5$

$Q_1 = 385.5$

$\boxed{Q_1 = 386}$

Now

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

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

which corresponds to value in which class 399-410. Therefore

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

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

$Q_3 = 399 + \frac{12}{7}(6.5)$

$Q_3 = 399 + \frac{78}{7}$

$Q_3 = 399 + 11$

$\boxed{Q_3 = 410}$

Q 4:

Ans:-

Class	fi	x	x^2	$f_i x$	$f_i x^2$
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
	$\Sigma = 94$			$\Sigma = 11575.5$	$\Sigma = 1565029.75$

Variance:

$$s^2 = \frac{\Sigma f_i x^2}{n} - \left(\frac{\Sigma f_i x^2}{n}\right)$$

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

$$s^2 = 16649.26 - 15164.35$$

$$s^2 = 1484.9$$

$$\boxed{s^2 = 1481}$$

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Standard Deviation

Taking square root of eq(1) we have $\sqrt{S^2} = \sqrt{1485}$

$$\boxed{S = 38.5}$$

Q.3

Ans: First Data:-

3, 6, 9, 1, 7, 5

$$\text{mean} = \frac{3+6+9+1+7+5}{6}$$

$$\text{Mean} = \frac{24}{6} = \boxed{4}$$

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

S. Deviation $= \sqrt{\frac{\Sigma x^2}{N} - \left(\frac{\Sigma x}{N}\right)^2}$

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

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

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

$S.D = \sqrt{4.7}$

$$\boxed{S.D = 2.2}$$

Second Data:

11, 17, 9, 7, 19, 15

$$\text{Mean} = \frac{11+17+9+7+19+15}{6}$$

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

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

x	x^2
11	121
17	289
9	81
7	49
19	361
15	225
Σ: 78	$\Sigma = 1126$

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

$$S.D = \sqrt{\frac{6756 - 6084}{36}}$$

$$S.D = \frac{\sqrt{672}}{36}$$

$$S.D = \sqrt{18.7}$$

1st data mean = 4
1st data S.D = 2 2
2nd data mean = 13
2nd data S.D = 4.3

The required relation is that
→ Mean of 2nd data is greater than mean of 1st data and standard deviation of 2nd dat is double the standard deviation of 1st data.

Q 5:-

Ans: Comment:-

NO, it is not obviously mat all the people have height 5 feet can easily cross it if he did not know swimming and river 2 feet at some points So, he will cross it.

Ans(B):-

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 a few students whose marks may be 60 or more.

Ans(c) :-

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.