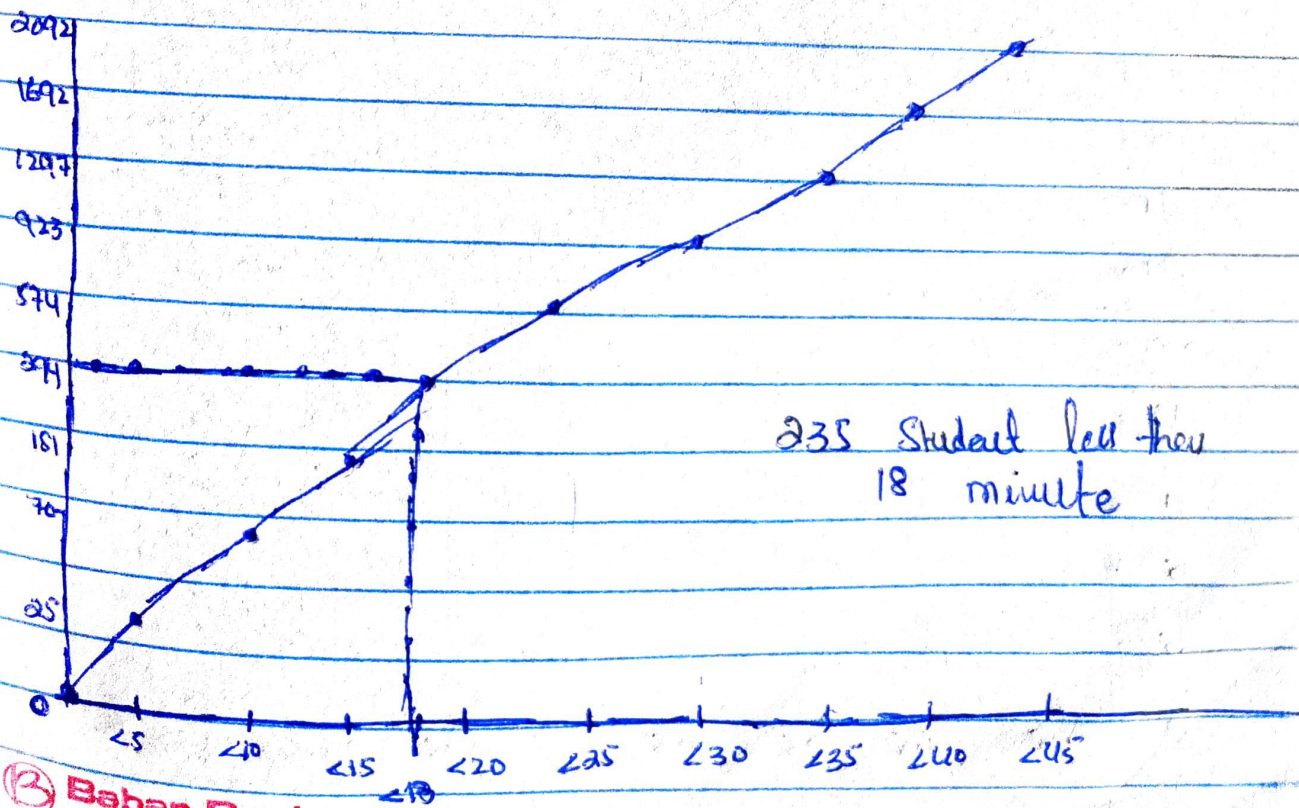


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 Subject : probability and Statistics  
 Semested :- 3rd  
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 Exam :- Mid Term

Qno:-  
Solution

Time	<5	<10	<15	<20	<25	<30	<35	<40	<45
Frequency	25	45	81	143	280	349	374	398	400

Q1:- Draw a Commulative frequency:  
 Ans:- Commulative: 25, 70, 151, 294, 574, 923, 1297, 1692, 2092

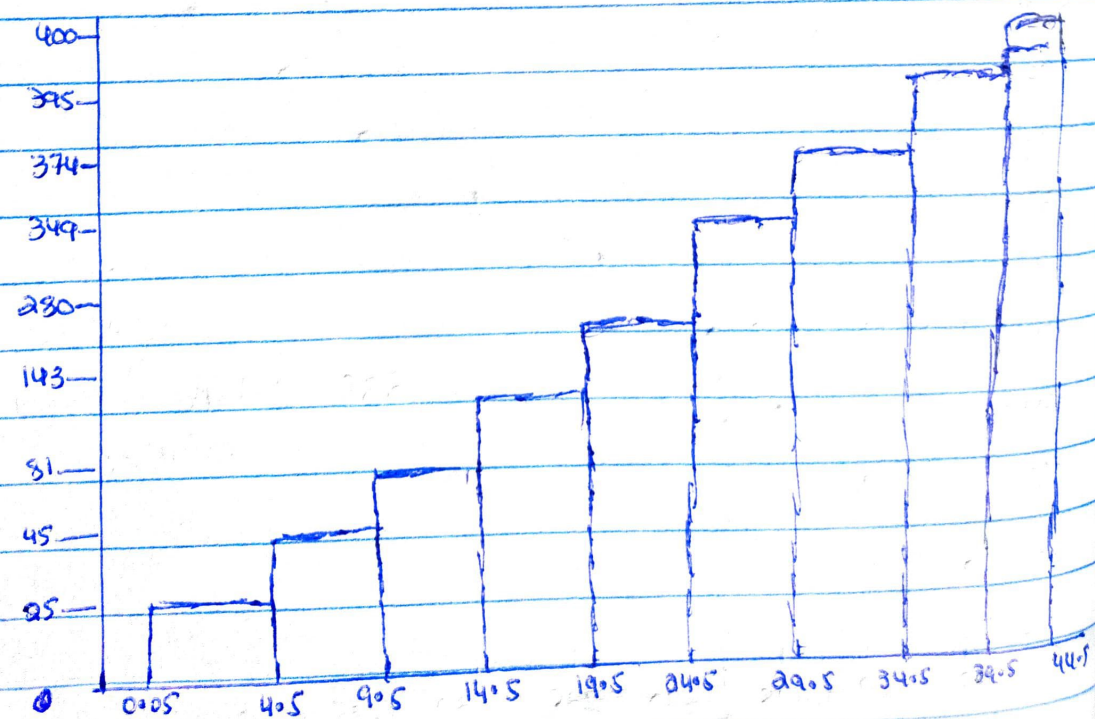


Qns: (b)

Take equal class interval of 0-5, 5-10 etc construct frequency distribution draw histogram

Ans:-

Class Interval	Frequency	Class boundary
0-4	25	0.05 - 4.05
5-9	45	4.05 - 9.05
10-14	81	9.05 - 14.05
15-19	143	14.05 - 19.05
20-24	280	19.05 - 24.05
25-29	349	24.05 - 29.05
30-34	374	29.05 - 34.05
35-39	395	34.05 - 39.05
40-44	400	39.05 - 44.05



Ques: Construct a grouped distribution table for the following data.

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

Ans:-

(a):- Total number of data = 30

Smallest Data = 362

Largest Data = 431

Range =  $431 - 362 = 69$

Class Interval =  $1 + 3.33 \log 30$

$= 1 + 3.33 (1.47) = 5.8951 = 6$

Class width =  $R/k$

$k =$  Class Interval

$R =$  Range

$h =$  Class width

$h = R/k$

$h = \frac{69}{6} = 11.5$

$= 11.5$

Class	Frequency	Cumulative	$f_x$
362 - 372	4	367	1468
373 - 383	3	378	1134
384 - 394	8	389	3112
395 - 405	5	400	2000
406 - 416	5	411	2055
417 - 427	3	422	1266
428 - 431	2	433	866
	$\Sigma f = 30$		11901

Mean =  $\bar{X} = \text{mean}$

$$\frac{\Sigma f_x}{\Sigma f} = \frac{11901}{30} = 396.7$$

Mode:

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

$$\begin{aligned} & 383.5 + \frac{(8-3) \times 11}{(8-3) + (8-5)} \\ & = 383.5 + 6.875 \\ & = 390.37 \end{aligned}$$

362 - 372	4	361.5 - 372.5
373 - 383	3	372.5 - 383.5
384 - 394	8	383.5 - 394.5
395 - 405	5	394.5 - 405.5
406 - 416	5	405.5 - 416.5
417 - 427	3	416.5 - 427.5
428 - 431	2	427.5 - 431.5

Quartile:-

$$(a) Q_1 = \frac{r \cdot n}{4} = \frac{1 \times 30}{4} = 7.5$$

$$f = 384, \text{ cf} - 1 = 7, \text{ f} = 8, \text{ i} = 10$$

$$Q_1 =$$

$$384 + \frac{7.5 - 7}{8} \times 10$$

$$Q_1 = 389.6$$

(b)

$$Q_2. \quad f = 384, \text{ cf} = 1, \text{ f} = 8, \text{ i} = 10$$

$$384 + \frac{15.7 - 7}{8} \times 10$$

$$Q_2 = 394$$

(c)  $Q_3 =$

$$\frac{r \cdot n}{4} = \frac{3 \times 30}{4} = 22.5$$

$$f = 406, \text{ cf} - 1 = 20, \text{ f} = 5, \text{ i} = 10$$

$$= 406 + \frac{22.5 - 20}{5} \times 10$$

$$Q_3 = 411$$

Q no 3 :-

① :-

x	x <sup>2</sup>
3	9
6	36
2	4
1	1
7	49
5	25
24	24

$$\text{Mean} = \frac{\sum x}{n} = \frac{24}{6}$$

$$\text{Mean} = 4$$

$$\text{S.D.} = \sqrt{\frac{\sum x^2}{n} - \left(\frac{\sum x}{n}\right)^2}$$

$$\sqrt{\frac{124}{6} - \left(\frac{24}{6}\right)^2}$$

$$\sqrt{20.6 - (4)^2}$$

$$\sqrt{4.6 - 16}$$

$$\sqrt{4.6} = 2.1$$

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

$$\text{Mean} = \frac{\sum x}{n} = \frac{78}{6} = 13$$

$$\text{S.D.} = \sqrt{\frac{1126}{6} - (13)^2}$$

$$\sqrt{187.6 - 169}$$

$$\sqrt{18.6}$$

$$4.31$$

Q no. 1:-

Ans:-

Class	F	$x$	$(x - \bar{x})$	$(x - \bar{x})^2$	$f(x - \bar{x})^2$
64-84	15	74	-40.14	2414.7	36220.5
85-104	18	94.5	-28.64	820.2	14763.6
105-124	27	114.5	-8.64	74.6	2015.2
125-144	10	134.5	11.36	129.0	1290
145-164	6	154.5	31.36	129	774
165-184	5	174.5	51.36	983.4	4917
185-204	13	194.5	71.36	5092.2	66198.6
	$\Sigma f = 94$				<u>126178.9</u>

$$\bar{x} = \frac{\Sigma fx}{\Sigma f}$$

$$\bar{x} = \frac{(15)(74) + (18)(94.5) + 27(114.5) + (10)(134.5) + 6(154.5) + 5(174.5) + 13(194.5)}{94}$$

$$\bar{x} = 11875.5/94$$

$$\bar{x} = 1230.14$$

Now

$$s^2 = \frac{\Sigma f(x - \bar{x})^2}{\Sigma f}$$

$$s^2 = \frac{126178.9}{94}$$

$$s^2 = 1342.3$$

∴ Taking root on both side

$$\sqrt{s^2} = \sqrt{1342.3}$$

$$s = 36.64$$

Q nos:-

Comment on the following sentences:

(a):

Ans:- As it can be observed from given data i.e. 2, 7, 5, 6 with the average 5 reflects all other points are different from average value show dispersion

(b)

Ans.

Reflect that an student average marks are 30 which reflects the poor performance of the whole class.

(c):

Ans:-

reflect the direct correlation among average income of king family and payments to their servants.

King family income  $\uparrow$   $\rightarrow$  payment servant  $\uparrow$