

NAME

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ID

14590

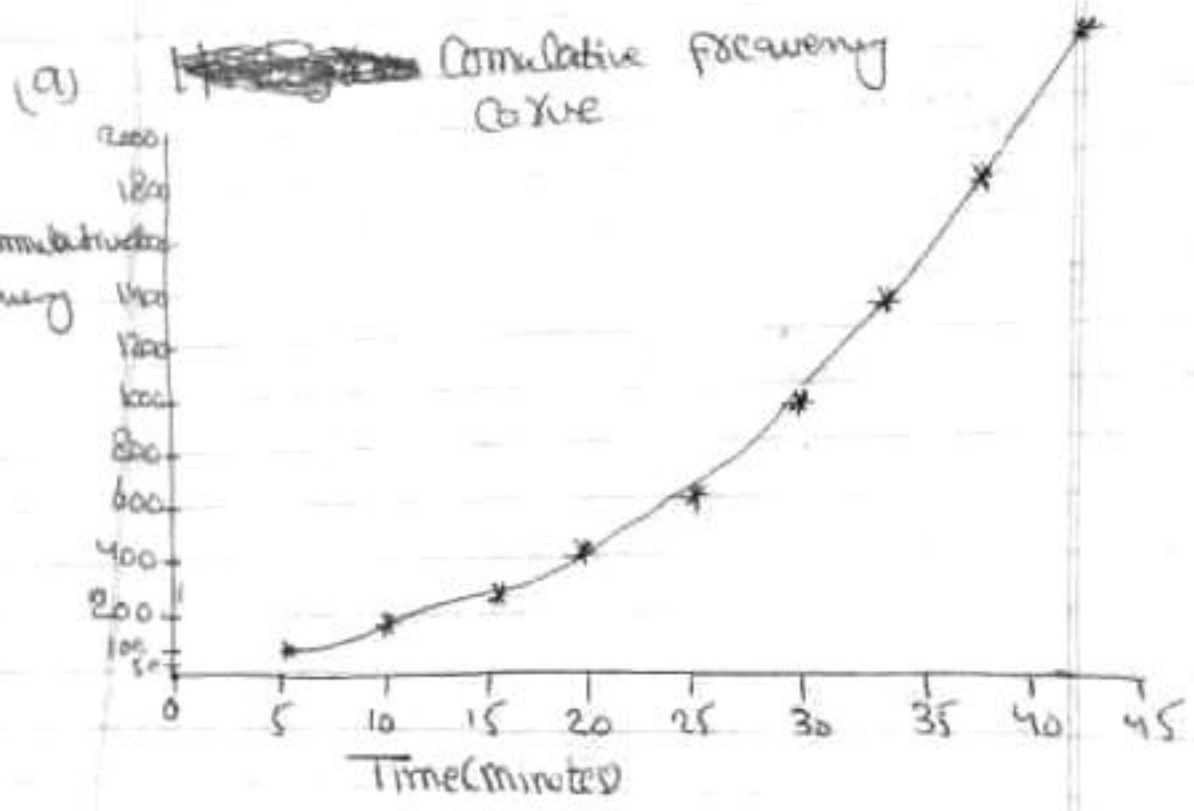
SUBJECT

PROBABILITY & Statistics

DATE :

16-4-2020

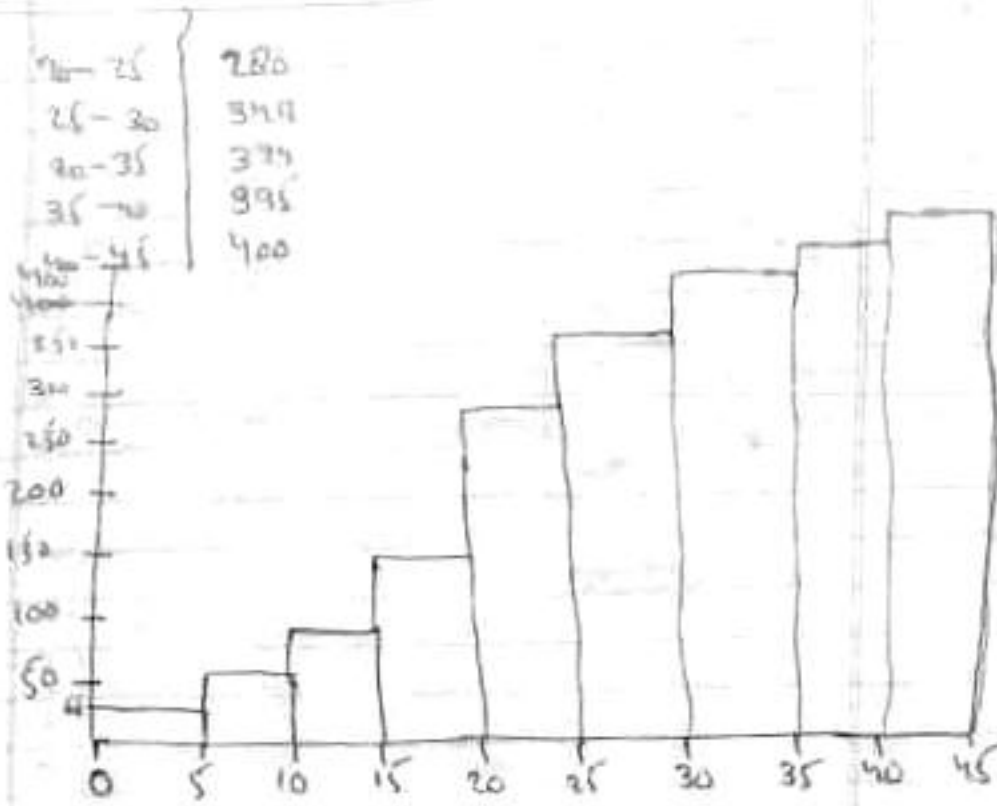
Q. 1	Time taken	Frequency	Cumulative frequency
	5	25	25
	10	45	70
	15	81	151
	20	143	294
	25	280	574
	30	379	923
	35	374	1297
	40	395	1692
	45	400	2092



(b) Histogram:

Frequency dist	Frequency
0-5	25
5-10	45
10-15	81
15-20	143

P. To



Histogramm.

Q: 2 Frequency distribution
Data are given.

① Range = $431 - 363 = \boxed{68}$

② Interval = $68 / 8 = \boxed{9}$

(P.T.O)

Data	Tally	Frequency	class boundary	midpoint	C.F
363 - 372		4	362.5 - 372.5	367.5	4
373 - 382		5	372.5 - 382.5	377.5	9
383 - 392		4	382.5 - 392.5	387.5	13
393 - 402		6	392.5 - 402.5	397.5	19
403 - 412		5	402.5 - 412.5	407.5	24
413 - 422		3	412.5 - 422.5	417.5	27
423 - 432		3	422.5 - 432.5	427.5	30
433 - 442	0	0	432.5 - 442.5	437.5	30
		30			30

① Mean = $\frac{\sum fx}{\sum f} = \frac{11866}{30} = \boxed{396}$

② Mode = $l + \frac{(f_m - f_1) \times h}{(f_m - f_1) + (f_m - f_2)}$

Mode = $392.5 + \frac{(6 - 4) \times 9}{(6 - 4) + (6 - 5)}$

~~Mode~~ = $392.5 + \frac{18}{2+1}$

~~Mode~~ = $392.5 + \frac{18}{3}$

~~Mode~~ = $392.5 + 1.30$

$\boxed{393.8}$

③ Quartiles for group frequency distⁿ

$$Q_n = l + \frac{\frac{n}{4} - cf_i}{N} \times h$$

$$x_i, i = 1, 2, 3$$

(p. To)

gegeben

$$N = \Sigma F = 30$$

Formula: $\bar{Q}_1 = \frac{\Sigma FN}{i}$

$$\bar{Q}_1 = \frac{1 \times 30}{4} = 7.5$$

$$L = 383$$

$$CF_1 = 4$$

$$FV = 5$$

$$i = 9$$

$$\bar{Q}_1 = 383 + \frac{7.5 - 4}{5} \times 9$$

$$383 + \frac{3.5}{5} \times 9$$

$$383 + 6.3$$

$$\bar{Q}_1 = 389.3$$

Now,

$$\bar{Q}_3 = \frac{\Sigma FN}{i} = \frac{3 \times 30}{4} = \frac{90}{4} = 22.5$$

$$\bar{Q}_3 = 22.5$$

$$L = 402.5$$

$$CF_1 = 19$$

$$FV = 5$$

$$i = 9$$

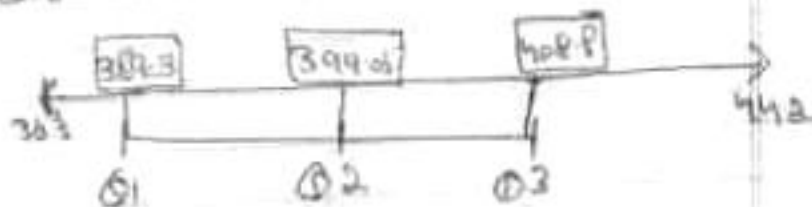
$$\bar{Q}_3 = 402.5 + \frac{22.5 - 19}{5} \times 9$$

$$402.5 + \frac{3.5}{5} \times 9$$

$$402.5 + 6.3$$

$$\bar{Q}_3 = 408.8$$

Now, $\sigma_2 = \sigma_{\text{variable 2}}$



Q.3 By multiplying each of numbers 3, 6, 2, 1, 7, 5 by 2 and then adding 5, we obtain 11, 17, 9, 7, 19, 15. What is the relation b/w the standard deviation and the mean of the two sets?

Sol: Arithmetic mean of 3, 6, 2, 1, 7, 5 is

$$\bar{x} = \frac{\sum x_i}{n} = \frac{3+6+2+1+7+5}{6}$$

$$\bar{x} = \frac{24}{6} = \boxed{4}$$

$$\begin{aligned} \text{Variance } s^2 &= \frac{\sum (x_i - \bar{x})^2}{n} \\ &= \frac{(3-4)^2 + (6-4)^2 + (2-4)^2 + (1-4)^2 + (7-4)^2 + (5-4)^2}{6} \end{aligned}$$

$$\frac{1+4+4+9+9+1}{6}$$

$$s^2 = \text{variance} = \frac{28}{6} = 4.6$$

$$\text{Standard deviation} = s = \sqrt{4.6} = \boxed{2.14}$$

Q. 2. (b)

Now mean and S.D for multiplied
and added data are:

11, 17, 9, 7, 19, 15

$$\bar{x} = \frac{\sum x_i}{n} = \frac{11+17+9+7+19+15}{6}$$

$$\bar{x} = \frac{78}{6} = \boxed{13}$$

$$\text{Variance} = S^2 = \frac{\sum (x_i - \bar{x})^2}{N}$$

$$S^2 = \frac{(11-13)^2 + (17-13)^2 + (9-13)^2 + (7-13)^2 + (19-13)^2 + (15-13)^2}{6}$$

$$S^2 = \frac{4 + 16 + 16 + 36 + 36 + 4}{6}$$

$$S^2 = \frac{112}{6} = \boxed{18.6}$$

$$\text{Standard deviation} = S = \sqrt{18.6}$$

$$S = \sqrt{18.6}$$

$$\boxed{S = 4.31}$$

The result show us, if we multiply
the above number, its number become
large and their variation is
also increase, as compare to
original data.

Q.4	Class	Frequency	midpoint	$f(x)$	$f(x^2)$
	64-84	16	74	110	8240
	85-104	18	94.5	1701	160744.5
	105-124	27	114.5	3091.5	353976.75
	125-144	10	134.5	1345	18092.5
	145-164	6	154.5	927	14322.25
	165-184	5	174.5	872.5	152251.25
	185-204	13	194.5	2528.5	491798.25
		$\Sigma f = 94$		11576.5	$\Sigma f(x^2) = 822841.975$

Find variance and standard deviation.

① Variance

$$\text{Formula} = s^2 = \frac{\Sigma f x^2 - \frac{(\Sigma f x)^2}{n}}{n-1}$$

$$s^2 = \frac{822841.975 - 1425448.93}{93}$$

$$s^2 = 47.3$$

Now, Standard deviation

$$s = \sqrt{47.3}$$

$$s = 6.8$$

Q5

a- DEPTH OF RIVER :-

The average depth of the river is 5 feet then it is not obviously that all the people have height 5 feet easily cross it. if he did not know swimming, important fact is river is not deep uniformly. It is 2 feet at some points while 7 feet on other point. So therefore he will cross.

b- STUDENTS :-

No, it does not mean every student is hopeless. There would be students whose marks are less than 20, while there can be few students whose marks might be 60 or more.

C- AVERAGE INCOME :-

No, it is not like that,

Average pay does not mean everyone get paid same.

The king income will be much more than servants.