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Subject

Probability & Statistics

Semester

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Program

BSCS

Instructor

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Q NO #1

Q. Students were asked how long it took them to walk to school on a particular morning. A cumulative frequency distribution was formed.

Time take (in minutes)	<5	<10	<15	<20	<25	<30	<35	<40	<45
Frequency	25	45	81	143	280	349	374	395	400

Solution:-

Class interval	f	C.B	Cf	Cf>
0-5	25	0-5.5	25	2092
5-10	45	5.5-10.5	70	2067
10-15	81	10.5-15.5	151	2022

15-20	143	15.5-20.5	294	1141
20-25	280	20.5-25.5	574	1798
25-30	349	25.5-30.5	923	1518
30-35	374	30.5-35.5	1297	1169
35-40	395	35.5-40.5	1692	795
40-45	400	40.5-45.5	2092	400

$CB = \text{LCI of 2nd class} - \text{UCL of 1st class}$

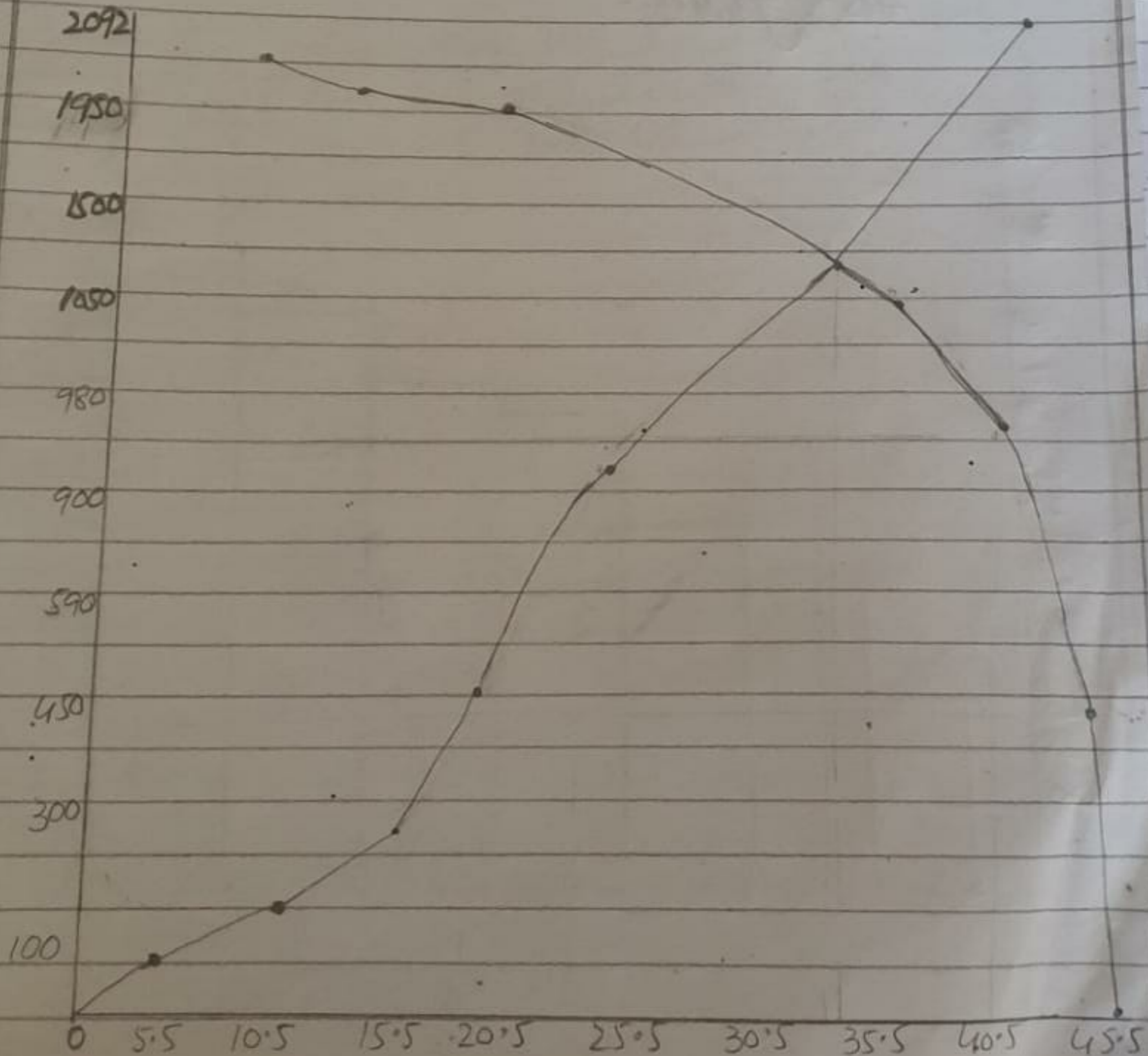
$$= 25.5 - 25.5$$

$$= 0$$

$$CB = 0$$

part (a)

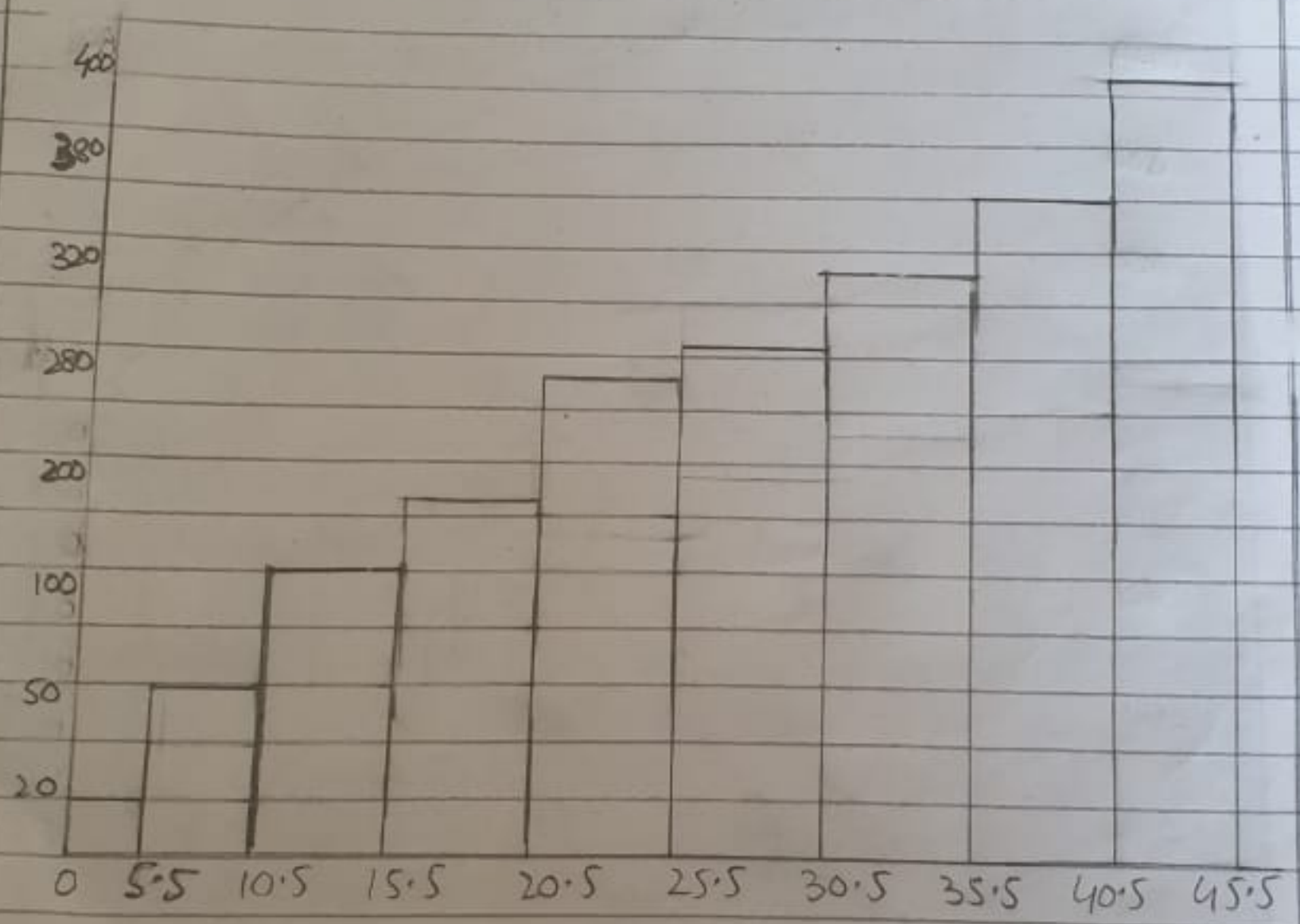
(A) Draw a commulative frequency curve & estimate how many students took less than 18 minutes.



part (b)

(b) Take equal class interval of 0-5, 10-etc construct frequency distribution & draw a histogram.

Histogram:-



Q NO#2

construct a grouped distribution table for the following data & calculate mean, mode & Quantiles

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

Solution

$$N = 30$$

$$x_m = 431$$

$$x_0 = 363$$

Range

$$R = x_m - x_0$$

$$R = 431 - 363$$

$$R = 68$$

No of classes

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

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

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

$$K = 5.92$$

$$K = 6$$

$$h = R/K$$

$$z = 68/6$$

$$z = h = 11.33 = 11$$

Classes	f	C.B	x	C.f	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	IIIIIIII
399-410	7	398.5-410.5	404.5	23	IIIIII
411-422	4	410.5-422.5	416.5	27	IIII
423-434	3	422.5-434.5	428.5	30	III

Mean

$$\bar{x} = \frac{\sum f_i x_i}{\sum f_i = N}$$

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

$$\bar{x} = 397.3$$

Mode:-

$$M = d_1 + \frac{f_1 - f_0}{2 \cdot f_1 - f_0 - f_2} (d_2 - d_1)$$

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

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

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

$$M = 386.5 + 9.6$$

$$M = 396.1$$

Quartiles:-

$$Q_1 = n/4$$

$$Q_1 = 30/4 = 7.5$$

$$Q_1 = d + n/f (Q_1 - c)$$

$$Q_1 = 374.5 + 12/4 (7.5 - 4)$$

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

$$Q_1 = 374.5 + 10.5$$

$$Q_1 = 385$$

$$D_3 = d + h/f (v_3 - c)$$

$$D_3 = 398.5 + 12/7 (22.5 - 16)$$

$$D_3 = 398.5 + 12/7 (6.5)$$

$$D_3 = 398.5 + 11.14$$

$$\boxed{D_3 = 409.64}$$

$$v_3 = \frac{3n}{4}$$

$$v_3 = \frac{3(30)}{4}$$

$$v_3 = \frac{90}{4}$$

$$\boxed{v_3 = 22.5}$$

Q NO # 3

First Set:-

3, 6, 2, 1, 7, 5

Mean = $\frac{\text{Sum of all number}}{\text{total number}}$

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

$$M = 4$$

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

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

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

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

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

$$S.D = \sqrt{4.67}$$

$$S.D = 2.16$$

x	x^2
3	9
6	36
2	4
1	1
7	49
5	25
<hr/>	<hr/>
24	124

* 2nd Set:-

11, 17, 9, 7, 19, 15

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

$$\boxed{M = 13}$$

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

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

$$= \sqrt{\frac{6756 - 6084}{36}}$$

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

$$= \sqrt{18.67}$$

$$\boxed{S.D = 4.32}$$

First Set mean = 4

First Set S.D = 2.16

2nd Set Mean = 13

2nd Set S.D = 4.32

Mean & S.D of 2nd set is greater than first set.

Q NO # 4

Q. For the following grouped distribution table calculate the variance & standard deviation.

CLASS	64-84	85-104	105-124	125-144	145-164	165-184	185-204
Frequency	15	18	27	10	6	5	13

Solution

CLASS	f_i	x_i	$f_i x_i$	x_i^2	$f_i \cdot x_i^2$
64-84	15	74	1110	5746	82140
85-104	18	94.5	1701	8930.25	160744.5
105-124	27	114.5	3091.5	13110.25	353976.75
125-144	10	134.5	1345	18090.25	180902.5
145-164	6	154.5	927	23870.25	143221.5
165-184	5	174.5	872.5	30450.25	152251.25
185-204	13	194.5	2528.5	37830.25	491793.25
					1565029.75

$$\sum f_i = 94$$

$$\sum f_i x_i = 11575.5$$

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

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

$$= 16649.25 - 15164.35$$

$$= 1484.9$$

$$\boxed{S^2 = 1484.9}$$

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

$$= \sqrt{1484.9}$$

$$= 38.54 \text{ Ans}$$

$$\boxed{S = 38.54} \text{ Ans}$$

QNO#5

Comments on the following sentences.

(a) Depth of River:-

Sol No. of average depth of river is 5 feet then it is not obvious that all the people of height 5 feet cross it if he can't swim he will drown. The important fact is that a river of average depth of 5 feet is not deep uniformly. It's 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 feet or 7 feet deep.

(b) Students:-

No. it doesn't mean every student is hopeless. There would be student 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't say every student is
hope less.

(C)

Average income:-

No its not like that average pay
doesn't mean everyone get
paid same. The King income
will be much more than
the servants.
