

Mid Semester Assignment ①
Spring 2020

Subject: Probability and Statistics

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Q1: Students were asked how long it took them to walk to school on a particular morning. A cumulative frequency distribution was formed

Time taken (in minutes) < 5 < 10 < 15 < 20 < 25 < 30 < 35 < 40 < 45

Frequency 25 45 81 143 280 349 374 395 400

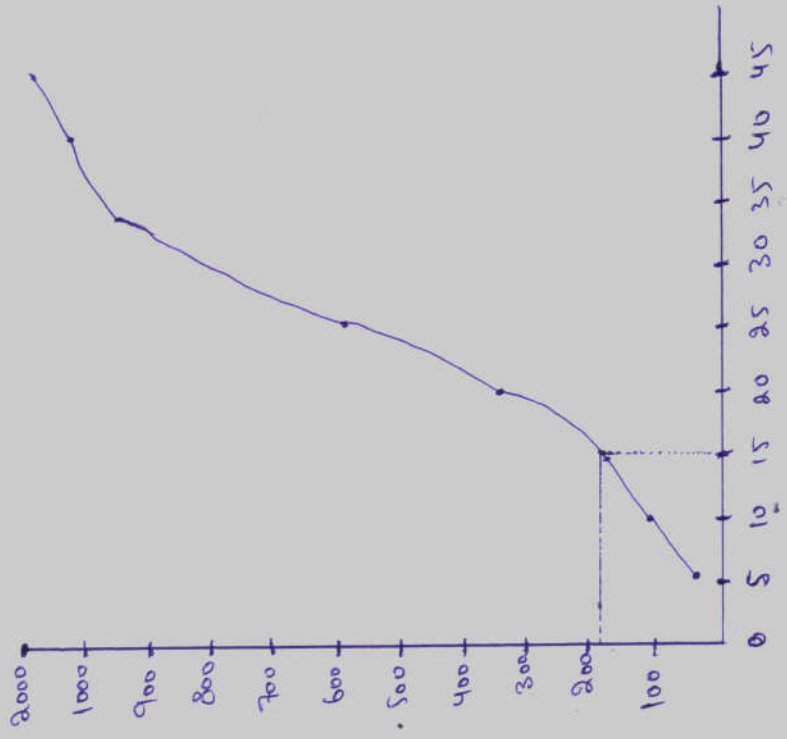
Q2 Draw a cumulative frequency curve and estimate how many students took less than 18 minutes.

sol

time	frequency	cf
5	25	25
10	45	70
15	81	151
20	143	294
25	280	574
30	349	923
35	374	1,297
40	395	1,692
45	400	2,092

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So, 151 students took less than 18 minutes to swim.

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

Sol

Class	class intervals	f	C.B	class mark (Mid Point x)
< 5	0-5	25	0.5-5.5	3
< 10	6-10	45	5.5-10.5	8
< 15	11-15	81	10.5-14.5	13
< 20	16-20	143	15.5-20.5	18
< 25	21-25	280	20.5-25.5	23
< 30	26-30	349	25.5-30.5	28
< 35	31-35	374	30.5-35.5	33
< 40	36-40	395	35.5-40.5	38
< 45	41-45	400	40.5-45.5	43

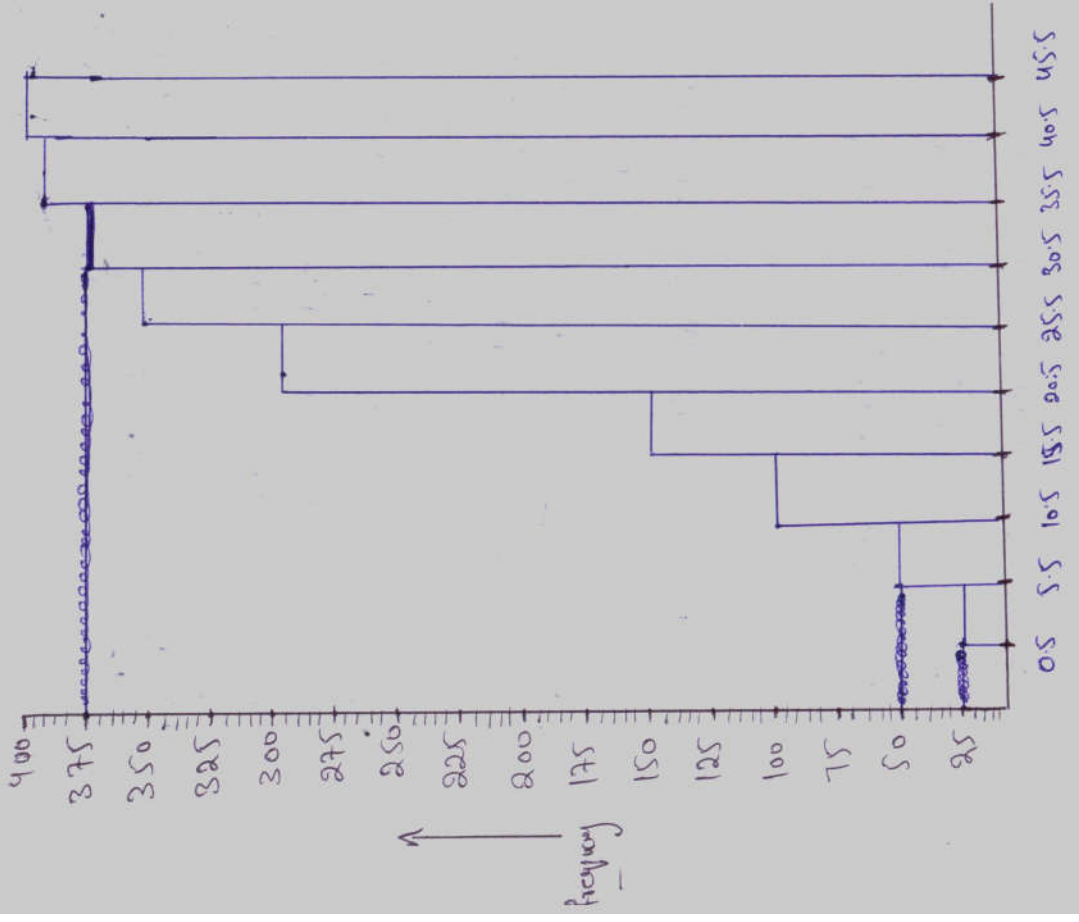
Scale

Y-axis \Rightarrow 1 big square = 25 units
 1 small square = 5 units

X-axis \Rightarrow 1 big square = 5 units
 1 small square = 1 unit

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Class boundaries →

Q2 Construct a grouped distribution table for the following data and Calculate Mean, Mode and Quartiles.

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

Sol Mode = Most = 0

$$\text{Mean} = \frac{\text{add} = 11,914}{30}$$

397.13

$$\frac{363 + 391}{2} = \boxed{377}$$

$$L.Q = \frac{431 + 401}{2} = \boxed{416}$$

$$H.Q = \frac{405 + 382}{2} = \boxed{393.5}$$

Q3

By multiplying each of the number 3.6.2.1
7.5 by 2 and then adding 5, we obtain
11, 17, 9, 7, 19, 15. What is the relation between
the standard deviation and the means of
two sets.

Data

x	x	$x - \bar{x}$	$(x - \bar{x})^2$
3	4	-1	1
6	4	2	4
2	4	-2	4
1	4	-3	9
7	4	3	9
5	4	1	1
<u>24</u>			<u>10</u>

total

$$\text{mean} = 24/6 = 4$$

$$\begin{aligned} \text{Standard deviation} &= \sqrt{\frac{\sum (x - \bar{x})^2}{n}} \\ &= \sqrt{\frac{10}{6}} \\ &= \sqrt{1.6} \end{aligned}$$

$$\text{Standard deviation} = 1.26$$

Date

x	\bar{x}	$x - \bar{x}$	$(x - \bar{x})^2$
11	13	-2	4
17	13	4	16
9	13	-4	16
7	13	-6	36
19	13	6	36
15	13	2	4
Total			112

Mean = $78/6$

$$\boxed{\text{Mean} = 13}$$

$$\begin{aligned} \text{Standard deviation} &= \sqrt{\frac{\sum (x - \bar{x})^2}{n}} \\ &= \sqrt{\frac{112}{6}} \\ &= \sqrt{18.6} \\ \boxed{\text{Standard deviation} = 4.3} \end{aligned}$$

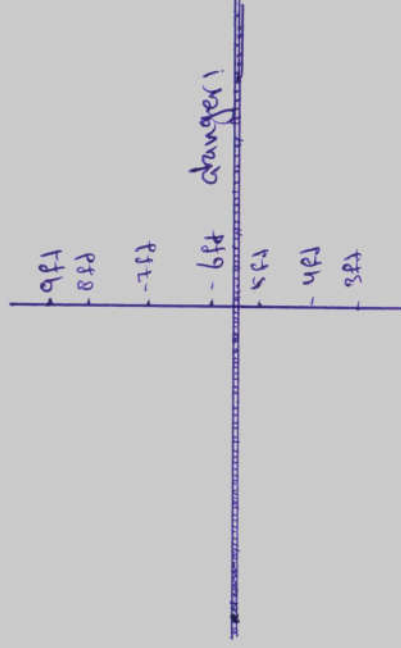
Q5 A

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Ans No, not all the people of height 5 feet can cross the average 5 feet depth. The first condition is that this is not compulsory for all 5 feet person that they can swim.

The most important fact is that a diver of average 5 feet depth isn't deep uniformly. It can be 2 feet deep at one location and 1 feet at other. It can be 6 feet at one place or more feet at other places. So, even if a person is 6 feet tall, he can still drown in the river at average 5 feet depth. So, it is clear that not all the people of 5 feet can cross the river (5 feet depth)



Q5 B

Ans Average is basically a calculated central value of a set of numbers. So, if we say that a class of the students have average 30 marks, it isn't compulsory that all students are higher. Average 30 marks doesn't mean that all students got the same 30 marks. Some may have got higher i.e. 40, 50, 60 etc. or some may have got less than 30 i.e. 10, 20, 30 or even zero. For example, the average of 2, 7, 9 is:

$$2+7+9 = 18 \quad 18/3 = 6$$

Q5 C

Ans As the income value of 20,000 per month is an average value of combined income of a King^{2nd} of household servants, the pay of different servants can be more or less. Smaller or greater, minimum or maximum.

The average data is used to measure ^{Centre} ~~Centre~~

tendency is a data set.

It works only when all values are equally important. Hence is this are the pay amount can be different for different servants. So we can't say that they should be proportionally paid. For example, you have a portfolio of stocks and it is highly unlikely that all stock will have same weight and therefore, the same impact on total performance of the portfolio. In finance, we have to work with unequal weights in order to prevent any harm in decision making. We should be familiar with situations when it fails the assumption of proportionally paying them is unrealistic. Also, overzeal is affected by extreme value is data set which in this case is £20,000. The mean may not coincide with any value of the salary of household servants

