FINAL ASSIGNMENT-2020

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BBA

BASIC STATISTICS

(1)

Geometric Mean (a)

S.No.	x	$\log x$
1	4	$\log 4 = 0.6020$
2	13	$\log 13 = 1.1139$
3	9	$\log 9 = 0.9542$
4	4	$\log 4 = 0.6020$
5	1	$\log 1 = 0$
		$\Sigma \log x = 3.2721$

$$G.M = \text{Anti-log} \frac{\Sigma \log x}{n}$$

$$= \text{Anti-log} \frac{3.2721}{5}$$

$$= \text{Anti log} \quad 0.6544$$

$$G.M = \boxed{4.512}$$

Geometric Mean:

(b).

Marks	Freq	x	$\log x$	$f \log x$
0 - 9	2	4.5	0.6532	2.9394
10 - 19	31	14.5	1.1613	16.8388
20 - 29	73	24.5	1.3891	34.0329
30 - 39	85	34.5	1.5378	53.0541
40 - 49	28	44.5	1.6483	73.3493
	$\Sigma f = 219$			$\Sigma f \log x = 180.2145$

$$G.M = \text{Anti-log} \frac{\Sigma f \log x}{\Sigma f}$$

$$\text{Anti-log} \frac{180.2145}{219}$$

$$\text{Anti-log } 0.8228.$$

$$\boxed{6.649}$$

(a). A.M

No. of childrens (x)	No. of family (f)	fx
1	4	4
2	13	26
3	9	27
4	4	16
5	1	5
	$\Sigma f = 31$	$\Sigma fx = 78$

$$A.M = \frac{\Sigma fx}{\Sigma f}$$

$$A.M = \frac{78}{31}$$

$$A.M = \boxed{2.51}$$

(4)

(b). A.M

Marks	Frequency	Mid-value (x)	fx
0 - 9	2	4.5	9
10 - 19	31	14.5	449.5
20 - 29	73	24.5	1788.5
30 - 39	85	34.5	2932.5
40 - 49	28	44.5	1246
	$\Sigma f = 219$		$\Sigma fx = 6425.5$

$$A.M = \frac{\Sigma fx}{\Sigma f}$$

$$A.M = \frac{6425.5}{219}$$

$$A.M = \boxed{29.3}$$

Harmonic Mean

(b).

Marks	Freq.	x	f/x
0 – 9	2	4.5	0.4444
10 – 19	31	14.5	2.1379
20 – 29	73	24.5	2.9795
30 – 39	85	34.5	2.4637
40 – 49	28	44.5	0.6292
	$\Sigma f = 219$		$\Sigma f/x = 8.6547$

$$H.M = \frac{\Sigma f}{\Sigma (f/x)} = \frac{219}{8.6547} = \boxed{25.30}$$

(9). H.M

S.No.	x	$1/x$
1	4	$1/4 = 0.25$
2	13	$1/13 = 0.076$
3	9	$1/9 = 0.111$
4	4	$1/4 = 0.25$
5	1	$1/1 = 1$
		$\Sigma 1/x = 1.687$

$$H.M = \frac{n}{\Sigma (1/x)}$$

$$= \frac{5}{1.687}$$

$$= \boxed{2.9638}$$

(6)

Logical Relationship:-

(a). G.M $\geq$ H.M $\geq$ A.M

4.512 $\geq$ 2.96 $\geq$ 2.51

(b). A.M $\geq$ H.M $\geq$ G.M

29.3 $\geq$ 25.30 $\geq$ 6.64

Median :- (a)

S.No.	x
1	4
2	13
3	9
4	4
5	1

$\xrightarrow{\text{Arrange in Ascending order}}$

S.No.	x
1	1
2	4
3	4
4	9
5	13

No. of item is 5 (odd).

So, Median = Size of $\left(\frac{n+1}{2}\right)$th item.

$$= \left(\frac{5+1}{2}\right)^{th} \text{ item}$$

$$= \frac{6^{th}}{2} \text{ item} = 3^{rd} \text{ item}.$$

Median = $\boxed{4}$

Median :- (b).

Marks	Frequency	C.B	C.F
0-9	2	0 – 8.5	2
10 – 19	31	9.5 – 18.5	33
20 – 29	73	19.5 – 28.5	106
30 – 39	85	29.5 – 38.5	191
40 – 49	28	39.5 – 48.5	219
	$\Sigma f = 219$		

Median = Size of $\left(\frac{n+1}{2}\right)$ + 2 item.

$= \frac{219+1}{2}$ th $= 110^{th}$ item

$l = 29.5$
$h = 9$
$f = 85$
$c = 106$.

Median $= l + \frac{h}{f}\left(\frac{n}{2} - c\right)$

$= 29.5 + \frac{9}{85}(109.5 - 106)$

$= 29.5 + \frac{9}{85}(3.5)$

$= 29.5 + 0.3705$

$= 10.9323$

Mode :- (a)

S.No.	x		S.No.	x
1	4		1	1
2	13	Arrange in	2	4
3	9	Ascending order	3	4
4	4	$\longrightarrow$	4	9
5	1		5	13

In the above data, 4 is more frequent value.

So here, Mode $\boxed{= 4}$.

(b) -

Marks	Frequency
0 - 19	2
10 - 19	31
20 - 29	73
30 - 39	85
40 - 49	28

The mode lies in the group 30 - 39 , So by formula .

$$\text{Mode} = l + \left(\frac{f_m - f_0}{2f_m - f_0 - f_1}\right) \times h$$

$l = 30$
$f_m = 85$
$f_0 = 73$
$f_1 = 28$
$h = 9$

$$\text{Mode} = 30 + \left(\frac{85-73}{2(85)-73-28}\right) \times 9$$

$$\text{Mode} = 30 + \left(\frac{12}{69}\right) \times 9$$

$$\text{Mode} = 30 + \frac{108}{69}$$

$$\text{Mode} = 30 + 1.5652$$

$$\text{Mode} = \boxed{31.5652}$$

Q3:- Part (a).

S.No.	x
1	4
2	13
3	9
4	4
5	1

$Q_2 = (n+1) \times 0.5$

$Q_2 = (5+1) \times 0.5$

$Q_2 = 6 \times 0.5$

$Q_2 = 4$

$Q_1 = (n+1) \times 0.25$

$Q_1 = (5+1) \times 0.25$

$Q_1 = 6 \times 0.25$

$Q_1 = 1.5$

$Q_3 = (n+1) \times 0.75$

$Q_3 = (5+1) \times 0.75$

$$Q_3 = 6 \times 0.75$$

$$Q_3 = 4.5$$

Semi Inter Quartile Range:-

$$\frac{Q_3 - Q_1}{2}$$

$$= \frac{4.5 - 1.5}{2}$$

$$= \boxed{1.5}$$

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Q3:- Part B.

S.No.	x
1	4
2	13
3	9
4	4
5	1

First we find A.M.

$$A.M = \bar{x} = \frac{4+13+9+4+1}{5}$$

$$\bar{x} = \frac{31}{5} = 6.2.$$

x	$x-\bar{x}$	$(x-\bar{x})^2$
6	$6-6.2 = 0.2$	0.04
8	$8-6.2 = 1.8$	3.24
10	$10-6.2 = 3.8$	14.44
12	$12-6.2 = 5.8$	33.64
14	$14-6.2 = 7.8$	60.84

$$\Sigma(x-\bar{x})^2 = 112.2$$

$$\text{Variance} = \frac{\Sigma(x-\bar{x})^2}{n}$$

$$\text{variance} = \frac{112.2}{5}$$

$$\text{variance} = \boxed{22.44}$$

Standard Deviation:-

$$S = \sqrt{\text{variance}}$$

$$S = \sqrt{22.44}$$

$$S.D = 4.73$$

Co-efficient of Variance =

$$C.V = \frac{S.D}{\bar{X}} \times 100$$

$$= \frac{4.73}{6.2} \times 100$$

$$= \boxed{76.29}$$

Question : 4.
Write short notes on following.

RANGE :

The range R is defined as the difference between the largest and the smallest observations in a set of data.

Symbolically : $R = x_m - x_0$

Where x_m stands for the largest observation and x_0 denotes the smallest one. When the ~~raw~~ data are grouped into a frequency distribution, the range is estimated by finding the difference between the upper boundary of the highest class and lower boundary of the lowest class. The range can not be computed if there are any open end classes in distribution.

The range is a simple concept and is easy to compute. It has however two serious disadvantages. First it ignores all the information available from the intermediate observations and second as its value is based only on two extreme (usually large or small) observations it might give a misleading picture of the spread in the data. It is therefore unsatisfactory measure of ~~data~~ dispersion. However it is appropriately used in statistical quality control charts of manufactured products, daily temperatures, stock prices etc. This is an absolute measure of dispersion. Its relative measure known as the co-efficient of dispersion.

Example : We have a data as; 6, 8, 9, 10, 12 - highest
lowest

so Range $= X_m - X_0$
$= 12 - 6 = 16$ → Range.

2. QUARTILE RANGE:

Quartile and the interquartile range can be used to group and analyze data sets.

A Quartile is a group of values and/or means that divide a data set into quarters or groups of four. A quartile is a value and not a group of numbers. Think of a quartile as a cut off point for each group. A group has to start and stop somewhere and that's exactly what a quartile does.

The interquartile range is a value that is difference between the upper quartile value and lower quartile value

Symbolically; $IQR = Q_3 - Q_1$

Example:

Median = 71

Lower half | Upper half

62 63 64 69 70 | 72 76 77 81 81

Upper quartile

Inter Quartile Range: 77-64 = 13

$Q_1 = 64$

$Q_3 = 77$

There are 5 values below the median (lower half), the middle value is 64 which is the first quartile. There are 5 values above the median (upper half), the middle value is 77 which is the third quartile. The IQR is 77-64 = 13; the IQR is the range of the middle 50% of the data

3. SEMI INTER QUARTILE RANGE:

The interquartile range is a measure of dispersion, defined by the difference between the third and first quartiles, and half of this range is called semi-interquartile Range (S.I.Q.R) or the quartile deviation (Q.D).

Symbollically;

$$QD = \frac{Q_3 - Q_1}{2}$$

Where Q_1 and Q_3 are the first and the third quartiles of the data. The QD has an attractive feature that the range "Median ± QD" contains approximately 50% of the data. The quartile deviation is superior to range as it is not affected by extremely large and small observations. It is simple to understand and easy to calculate. It however give no information about the position of observations lying outside the two quartiles, is amenable to mathematical treatment and is greatly affected by sampling variability. The quartile deviation is not as widely used as other measures of dispersion. It is however, used in situations where extreme observations are thought to be unrepresentative.

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