



Section D

COMSATS University

Islamabad

Abbottabad Campus

Sr. No. CA008100

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Name: Syeda Batool Fatima

Reg. No.: FA21-BSE-153

Course Title: Statistics

Candidate's Signature: *SB*

Section	Q #1	Q #2	Q #3	Q #4	Q #5	Q #6	Q #7	Q #8	Q #9	Q #10	Sub Total	Grand Total (A+B+C)
A	9/10	12/13	13/13	14/14								48/56
B												
C												

Question # 1

True / False :-

- (i): True because for - negative value G.M cannot be calculated and for 0 H.M can't be calculated.
- ii) True by using formula Median = $\left(\frac{n+1}{2}\right)^{th}$ position and then splitting the value. *sol 7*
- iii) False as $V(a) \geq 0$; $V(ax) = a^2(Vx)$ for $V(2x) \Rightarrow a = 2$
 $(2)^2(Vx) \Rightarrow 2^2(9) \Rightarrow 4(9) = 36$.
- iv) True because $S.D = \sqrt{Var} \Rightarrow S.D = S = \sqrt{64} = 8$.
- 5) False b/c median is always equal to $Q_2 = D_5 = P_{50}$
- 6) True b/c secondary data is calculated by any statistical treatment.
- 7) False b/c while constructing class limits there is a difference of 1 in lower class limit of a class and upper class limit of previous class; but in class boundary no gap.
- 8) True; *freq* frequency which repeats mostly is mode.
- 9) True b/c $Var = S^2$ *var*
- 10) False: Range is absolute Coefficient of range is relative

Question #2

Construct frequency distribution with $k=5$ and $h=5$

Classes	C.b Class Boundaries	Midpoint	f	C.f
1-5	0.5-5.5	3	4	4
6-10	5.5-10.5	8	4	8
11-15	10.5-15.5	13	5	13
16-20	15.5-20.5	18	5	18
21-25	20.5-25.5	23	2	20

$\sum f_i = 20$

Class Boundary: $L.C.B - 0.5 = L.C.B$

$U.C.B + 0.5 = U.C.B$

No of classes,

$k = 1 + 3.3 \log n = 1 + 3.3 \log (20) = 5.2$

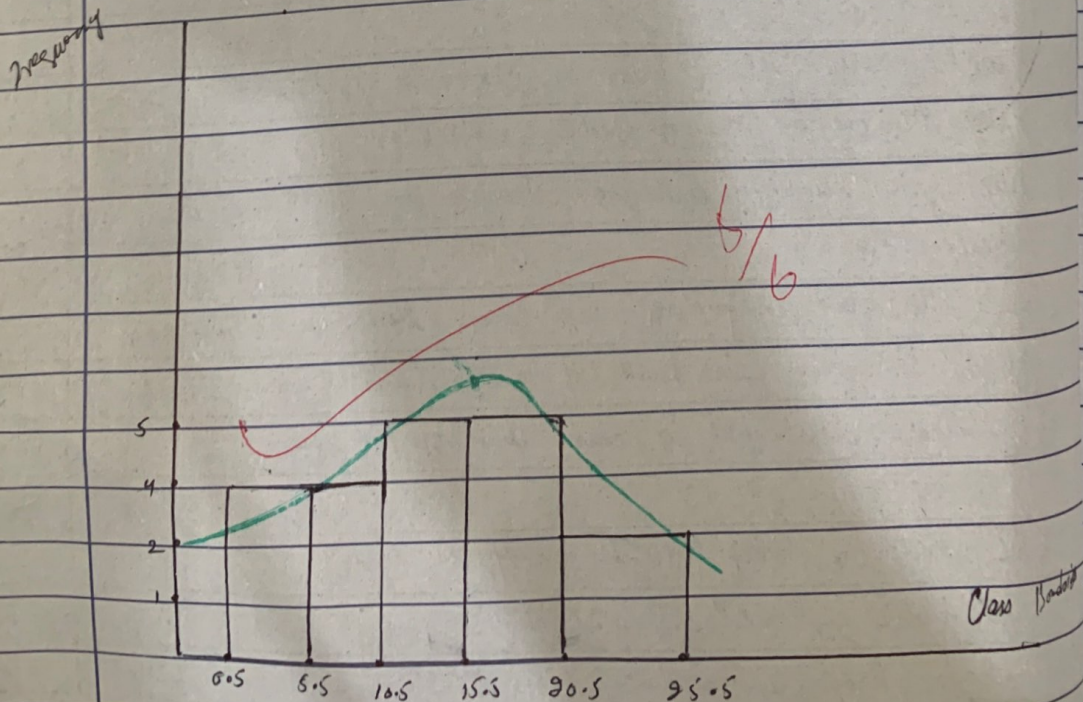
Take 5 classes.

Class interval $\Rightarrow h = R/k \Rightarrow$

Midpoint $= L.C.B + U.C.B / 2 \therefore$

Check $= \sum f_i = n = 20$

(b) Draw histogram & discuss shape of given data.



Shape of given data :

~~slightly~~ The shape of given data in histogram is negatively skewed: b/c tail is elongated at left side.

or close to symmetric

Question #3

Classes.	f	$\Sigma f x_i$	x_i	C.f	C.b
5-9	2	14	7	2	4.5-9.5
10-14	7	84	12	9	9.5-14.5
15-19	9	153	17	18	14.5-19.5
20-24	2	44	22	20	19.5-24.5

$$\Sigma f_i = 20 \quad \Sigma f_i x_i = 295$$

Calculate median and Mean:-

① Mean:

$$A.M = \frac{\Sigma f_i x_i}{\Sigma f_i}$$

$$A.M = \frac{295}{20} \Rightarrow A.M = 14.75$$

② Median :-

$$\text{Mean} = d + \frac{h}{f} \left(\frac{n}{2} - c \right)$$

1st step:

locate $n/2$ Search $n/2$ in C.f column and locate median class.

$$n = \Sigma f_i = 20 \Rightarrow 20/2 = 10$$

d is l.c.b of median class $\Rightarrow 14.5$

h is class interval = 5

f is frequency of median class = 9

c is c.f of class before median class 9

$$\text{Median} = 14.5 + \frac{5}{9} (10 - 9)$$

$$\text{Median} = 14.5 + \frac{5}{9} (1)$$

$$\text{Median} = 14.5 + 0.5$$

$$\text{Median} = 15$$

Question #4:

Given data:-

$$3, 4, 3, 5, 6, 7, 4 \Rightarrow n = 7$$

Calculate Co-efficient of Variation (C.V.)-

$$C.V = \frac{S.D}{\text{Mean}} \times 100$$

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

To calculate S.D we have to calculate Variance

$$\text{Mean} = \frac{\sum x_i}{n} \quad \text{Mean} = \frac{\sum x_i}{n}$$

x_i	x_i^2
3	9
4	16
3	9
5	25
6	36
7	49
4	16

$$\sum x_i = 32 \quad \sum x_i^2 = 160$$

$$① \text{Var}(x) = \frac{(\sum x_i)^2}{n} - \left(\frac{\sum x_i}{n} \right)^2$$

$$\text{Var}(x) = \frac{160}{7} - \left(\frac{32}{7} \right)^2$$

$$\text{Var}(x) = \frac{160}{7} - (4.5)^2$$

$$\text{Var}(x) = 22.8 - 20.25$$

$$\text{Var}(x) = 2.55$$

$$② \text{S.D} = \sqrt{\text{Var}} = \sqrt{2.55} \quad \text{S} = \sqrt{2.55}$$

$$\text{S.D} = \text{S} = 1.596$$

$$\text{C.V} = \frac{\text{S.D}}{\text{Mean}} \times 100$$

$$\text{C.V} = \frac{\text{S}}{\sum x_i / n} \times 100 \quad \text{C.V} = \frac{1.596}{4.5} \times 100$$

$$\text{C.V} = 0.354 \times 100 = 35.4\%$$

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- ⑥ Describe difference b/w variance and C.V with respect to absolute and relative measure of dispersion.

Measure of dispersion :-

Deviation of data from mean value is called dispersion of data. We use different measures of dispersion in order to calculate the dispersion. (Used to compare two data sets or more data sets)

Mostly used measure of dispersions -

- ① Mean Variance
- ② Standard deviation
- ③ Range

Absolute measure of dispersion

Expressed in the same unit as that of data.
e.g. if data is in kg: absolute measure's unit will also be kg.

In order to compare two or more data sets if both datasets have same unit then use absolute measure of dispersion.

Variance :-

Variance is absolute measure of dispersion measured in the same unit as that of data but after calculating variance, the unit is squared
e.g. kg^2 , m^2

Relative measure of dispersion

They are unitless.
Relative measure of dispersion are expressed in % age.

If the unit of datasets is not same than relative measure of dispersion used.

C.V

Coefficient of variance is relative unit of dispersion and measured in term of % age.
e.g. 50%

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