

Date: 11. 08. 022

Day: Thursday

UNIT-II

ARITHMETIC MEAN: (Average)

i) For raw data:

$$A.M = \bar{x} = \frac{\sum x}{n}$$

where

$n \rightarrow$ No of observations

ii) For discrete frequency data

x	x_1	x_2	x_3	x_4	...
f	f_1	f_2	f_3	f_4	...

$$\bar{x} = \frac{\sum fx}{N}$$

where, $N = \sum f$ (Total frequency)

$$\bar{x} = A + \frac{\sum fd}{N} \quad \text{If } x_i > 100$$

where, $A = \text{Assumed value}$

$$d_i = x_i - A \quad \text{or} \quad d_i = \frac{x_i - A}{h}$$

$$N = \sum f \quad (\text{Total frequency})$$

iii) For continuous frequency data:

Date : 13.08.022

Day : Thursday

x	$x_0 - x_1$	$x_1 - x_2$	$x_2 - x_3$
f	f_1	f_2	f_3

$$\bar{x} = A + \frac{\sum fd}{N} \times i$$

where, A = Assumed value

$d = \frac{x - A}{i}$, x = Midvalue of class interval

i = length of the class interval

Date : 13.08.022

Day : Saturday

1. Find the A.M of the following data If 3 is added to each, then find the new A.M:

12, 50, 10, 9, 11, 14, 6, ,

$\bar{x} = \frac{\sum x}{n} = \frac{12 + 50 + 10 + 9 + 11 + 14 + 6}{7}$

$= \frac{112}{7}$

$\bar{x} = 16$

Date : 13.08.2022
 Day : Saturday

If 3 is added to each, then new A.M

$$\begin{aligned}\bar{x} &= \frac{\sum x}{n} = \frac{112 + 7(3)}{7} \\ &= \frac{112}{7} + \frac{7(3)}{7} \\ &= 16 + 3\end{aligned}$$

$$\bar{x} = 19$$

[NOTE : In general, If a is added to each element then the new A.M.

$$\text{New A.M} = \text{Old A.M} + a]$$

2. The following table gives the marks obtained by 10 students in a class Calculate the A.M :

Roll No	1	2	3	4	5	6	7	8	9	10
MARKS	40	50	30	60	70	80	40	50	60	90

Sol:

$$\begin{aligned}\bar{x} &= \frac{\sum x}{n} = \frac{40+50+30+60+70+80+40+50+60+90}{10} \\ &= 570/10\end{aligned}$$

$$\bar{x} = 57$$

TYPE - II

1. From the following data, find the mean height:

Height (inches)	60	61	62	63	64
No. of children	2	3	5	8	7

Soln
Method →

$$A = 62$$

x	f	$d = x - A$	fd
60	2	-2	-4
61	3	-1	-3
62	5	0	0
63	8	1	8
64	7	2	14
$\sum f = 25$			$\sum fd = 15$

$$\bar{x} = A + \frac{\sum fd}{N}$$

$$= 62 + \frac{15}{25}$$

$$= 62 + 3/5$$

$$= 62 + 0.6$$

$$\bar{x} = 62.6$$

Date : 13.08.02
Day : Saturday

Method-II

x	f	fx
60	2	120
61	3	183
62	5	310
63	8	504
64	7	448
	25	1565

$$\bar{x} = \frac{\sum fx}{N}$$

$$= \frac{1565}{25}$$

$$= 62.6 //$$

2. From the following data of marks obtained by 60 students of a class calculate the A.M:

Marks (x)	20	30	40	50	60	70
No. of Students (f)	8	12	20	10	6	4

$$A = 40$$

x	f	$d = x - A$	fd
20	8	-20	-160
30	12	-10	-120
40	20	0	0
50	10	10	100
60	6	20	120
70	4	30	120
$\sum f = 60$			$\sum fd = 60$

Date : 13.08.2022

Day = Saturday

$$\bar{x} = A + \frac{\sum fd}{N}$$

$$= 40 + \frac{60}{60}$$

$$= 40 + 1$$

$$= 41.$$

3.

From the following data find the A.M:

Heights (cm)	120	122	124	126	128	130
No. of Students	5	7	9	6	4	10

$$A = 124$$

x	f	$d = x - A$	fd
120	5	-4	-20
122	7	-2	-14
124	9	0	0
126	6	2	12
128	4	4	16
130	10	6	60
$\sum f = 41$		$\sum fd = 54$	

Date: 13.08.2022

Day: Saturday

$$\bar{x} = A + \frac{\sum fd}{N}$$

$$= 124 + \frac{54}{41}$$

$$= 124 + 1$$

$$= 125.317$$

TYPE-III

1. The following is the age distribution of 100 persons in a street. Calculate the Arithmetic Mean:

Age Group	0-10	10-20	20-30	30-40	40-50	50-60
No. of person	5	10	25	30	20	10

$$P = 10$$

$$A = 25$$

Class Interval	f	Mid value x	$d = \frac{x-A}{P}$	fd
0-10	5	5	$\frac{5-25}{10} = -2$	-10
10-20	10	15	$\frac{15-25}{10} = -1$	-10
20-30	25	25	0.	0
30-40	30	35	1	30
40-50	20	45	2	40
50-60	10	55	3	30
	$\Sigma f = 100$			$\Sigma fd = 80$

Date : 17.08.2022

Day Wednesday

$$\begin{aligned}
 \text{Mean} = \bar{x} &= A + \frac{\sum fd}{\sum f} \times i \\
 &= 25 + \frac{80}{100} \times 10 \\
 &= 25 + 8 \\
 &= 33 //
 \end{aligned}$$

- Q1 Find the missing frequency for the following distribution if the mean is 12.9

Class Interval	0-5	5-10	10-15	15-20	20-25
Frequency	3	F	8	5	4

Class Interval	f	Mid value	$d = \frac{x-A}{i}$	fd
0-5	3	2.5	$\frac{2.5-12.5}{5} = -2$	-6
5-10	F	7.5	-1	-F
10-15	8	12.5	0	0
15-20	5	17.5	1	5
20-25	4	22.5	2	8
Total	20+F			7-F

Date : 17.08.022

Day : Wednesday

$$\bar{x} = 12.9$$

$$\text{Mean} = \bar{x} = A + \frac{\sum fd}{\sum f} \times i$$

$$12.9 = 12.5 + \frac{(7-F)}{(20+F)} \times 5$$

$$12.9 - 12.5 = \frac{(7-F)}{(20+F)} \times 5$$

$$0.4 = \frac{35 - 5F}{20+F}$$

$$0.4(20+F) = 35 - 5F$$

$$8 + 0.4F = 35 - 5F$$

$$0.4F + 5F = 35 - 8$$

$$5.4F = 27$$

$$F = 27 / 5.4$$

$$\boxed{F = 5}$$

Q2. Compute mean from the following Data:

Midvalues	115	125	135	145	155	165	175	185	195
Frequency	8	25	48	72	116	66	38	22	3

Date : 17.08.2022

Day : Wednesday

Given:

C.F	110-120	120-130	130-140	140-150	150-160	160-170	170-180
F	6	25	48	72	116	60	38
	180-190	190-200					
	22	3					

$$P.21 = ?$$

$$A = 155$$

Class Interval	f	Mid Value x	$d = \frac{x - A}{i}$	$f.d$
110-120	6	115	$\frac{115 - 155}{10} = -4$	-24
120-130	25	125	$\frac{125 - 155}{10} = -3$	-75
130-140	48	135	$\frac{135 - 155}{10} = -2$	-96
140-150	72	145	-1	-72
150-160	116	155	0	0
160-170	60	165	1	60
170-180	38	175	2	76
180-190	22	185	3	66
190-200	3	195	4	12
	$\sum f = 390$			$\sum fd = -53$

Date : 17.08.022

Day : Wednesday

$$\bar{x} = A + \frac{\sum f d}{n} x_i$$

$$= \frac{155 + -53}{390} \times 10$$

$$= 155 - \frac{530}{390}$$

$$= 155 - 1 \cdot 35897$$

$$= 153.64103$$

Date : 26.08.2022

Day : Saturday

3. Calculate the median for the following data :-

Savings (in Rs)	10	20	30	40	50	60	70	80
Cumulative frequency	15	35	64	84	96	120	192	256

Date : 20. 08. 02

Day : Saturday

Saving (in Rs)	0-10	10-20	20-30	30-40	40-50	50-60	60-70
Frequency	15	20	29	20	12	24	72
	70-80	64					

$$i = 10$$

$$A = 45$$

Class Interval	f	Mid value x_c	$d = \frac{x_c - A}{i}$	fd
0 - 10	15	5	$d = \frac{5 - 45}{10} = -4$	-60
10 - 20	20	15	-3	-60
20 - 30	29	25	-2	-58
30 - 40	20	35	-1	-20
40 - 50	12	45	0	0
50 - 60	24	55	1	24
60 - 70	72	65	2	144
70 - 80	64	75	3	192
	$\sum f = 286$			$\sum fd = 162$

Date : 20.08.22

Day : Saturday

$$\bar{x} = A + \frac{\sum fd}{\sum f} \times i$$
$$= 45 + \frac{162}{256} \times 10 = 45 + \frac{1620}{256}$$
$$= 45 + 6.3281$$

MEDIAN :

$$= 51.3281$$

Median is the value which divides the distribution into two halves. Thus the median is the mid value of the distribution.

Finding of Median:

i) For raw data and discrete frequency data:

Arrange the data in ascending order

$$\text{Median} = \text{size of } \left(\frac{N+1}{2} \right)^{\text{th}} \text{ item.}$$

ii) For continuous frequency data:

$$\text{Median} = L + \frac{N/2 - C.F.}{f} \times i$$

Where,

L = Lower limit of the median class

$C.F.$ = C.F. of the class preceding to the median class.

f = Frequency of the median class.

Date : 20. 08. 02
Day : Saturday

$N = \sum f = \text{total frequency}$
 $i = \text{length of the class interval}$

TYPE - I

1. Find the median marks of 9 students

Given data : 70, 60, 75, 90, 65, 80, 42, 65, 72

Ascending order :

42, 60, 65, 65, 70, 72, 75, 80, 90

Median = size of $(\frac{N+1}{2})^{\text{th}}$ item.

= size of $(\frac{9+1}{2})^{\text{th}}$ item

= size of 5th item.

Median = 70

2. Find the median of the following data :

84, 91, 72, 68, 87, 78

Date : 20.08.02

Day : Saturday

Sol: Ascending order:

68, 72, 78, 84, 87, 91

Median = size of $\left(\frac{N+1}{2}\right)^{\text{th}}$ item

= size of $\left(\frac{6+1}{2}\right)^{\text{th}}$ item

= size of $(3.5)^{\text{th}}$ item

= $\frac{1}{2} (3^{\text{rd}} \text{ item} + 4^{\text{th}} \text{ item})$

= $\frac{1}{2} (78 + 84)$

= $\frac{1}{2} (162)$

= 81

Type-II

1. Calculate the median of the following:-

X	10	15	8	20	18
y	24	6	30	16	21

Sol:

80)

x	f	c.f
8	30	30
10	24	54
15	6	60
18	26	86
20	16	102
	102	

$$\text{Median} = \text{size of } \left(\frac{N+1}{2} \right)^{\text{th}} \text{ item}$$

$$= \text{size of } \left(\frac{102+1}{2} \right)^{\text{th}} \text{ item}$$

$$= \text{size of } (51.5)^{\text{th}} \text{ item}$$

$$= \frac{1}{2} (51^{\text{th}} \text{ item} + 52^{\text{th}} \text{ item})$$

$$\therefore \text{Median} = \frac{1}{2} (10 + 10) = 20/2 \text{ dollars}$$

$$\text{Median} = 10$$

2. Calculate the median of the following distribution

Heights (cm)	120	122	124	126	128	130
No. of Student	5	7	9	6	4	10

(b) 1:

x	f	C.F
120	5	4
122	7	9
124	9	15
126	6	22
128	4	30
130	10	40
	41	

Median = size of $(\frac{N+1}{2})^{\text{th}}$ item

= size of $(\frac{41+1}{2})^{\text{th}}$ item

= size of $(\frac{42}{2})^{\text{th}}$ item

= size of $(21)^{\text{th}}$ item

Median = 124.

3. Calculate the median of the following data:

Marks	5	10	15	20	25	30	35	40	45	50
Frequency	40	43	75	76	92	45	39	9	88	6

Date : 22.08.022

Day : Monday

8

x	f	C.F
5	20	20
10	43	63
15	75	138
20	76	214
25	72	286
30	45	331
35	39	376
40	19	379
45	88	467
50	6	473
	473	

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

$$= \text{size of } \left(\frac{473+1}{2} \right)^{\text{th}} \text{ item}$$

$$= \text{size of } \left(\frac{474}{2} \right)^{\text{th}} \text{ item}$$

Date : 02.08.022
Day : Monday

= Size of $(237)^{\text{th}}$ item

Median = 25

- A. The content of 50 boxes of matches were counted giving the following results:-

No. of matches	41	42	43	44	45	46
No. of boxes	5	8	13	12	7	5

X	F	C.F
41	5	5
42	8	13
43	13	26
44	12	38
45	7	45
46	5	50
	50	

Date : 22.08.2022
Day : Monday

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

$$= \text{size of } \left(\frac{50+1}{2} \right)^{\text{th}} \text{ item}$$

$$= \text{size of } (25.5)^{\text{th}} \text{ item}$$

$$\text{Size of } (25^{\text{th}} \text{ item} + 26^{\text{th}} \text{ item})$$

$$= \frac{1}{2} \text{ size of } ((43+43)^{\text{th}} \text{ item})$$

$$= \frac{1}{2} (86)^{\text{th}} \text{ item}$$

$$= \frac{1}{2} \times 43 = 21.5$$

$$\text{Median} = 43$$

TYPE-III

1. Calculate the median for the following data:

Class Interval	120-150	150-180	180-210	210-240	240-270	270-300
Frequency	25	65	135	430	320	175
	300-330	330-360				
	99	21				

$$f = 30$$

C.F	F	C.F
120-150	25	25
150-180	65	90
180-210	135	225
210-240	430	655

240 - 270	320	975
270 - 300	175	1150
300 - 330	79	1229
330 - 360	21	1250
	831250	625

$$\begin{aligned}
 \text{Median class} &= \text{size of } \left(\frac{N+1}{2} \right)^{\text{th}} \text{ item} \\
 &= \text{size of } \left(\frac{1250+1}{2} \right)^{\text{th}} \text{ item} \\
 &= \text{size of } (625.5)^{\text{th}} \text{ item}
 \end{aligned}$$

Median class = 210 - 240

$$\text{Median} = L + \frac{N/2 - C.F}{F} \times i$$

Here $L = 210$; $C.F = 225$

$$F = 430; N = 1250; i = 30$$

$$\begin{aligned}
 \text{Median} &= 210 + \frac{1250/2 - 225}{430} \times 30 \\
 &= 210 + \frac{400}{430} \times 30 \\
 &= 210 + 27.9 \quad \text{Median} = 237.9
 \end{aligned}$$

Date : 20.08.022

Day : Tuesday

S 2. Compute median from the following data :

Mid value	115	125	135	145	155	165	175	185	195
Frequency	6	25	48	72	116	60	38	22	3

Sol:

Mid value	110-120	120-130	130-140	140-150	150-160	160-170	170-180	180-190	190-200
Frequency	6	25	48	72	116	60	38	22	3

C.I	F	C.F
110 - 120	6	6
120 - 130	25	31
130 - 140	48	79
140 - 150	72	151
150 - 160	116	267
160 - 170	60	327
170 - 180	38	365
180 - 190	22	387
190 - 200	3	390
	F = 390	

Date : 23.08.2022

Day : Tuesday

Median Class = size of $(\frac{N+1}{2})^{\text{th}}$ item

$$= \text{size of } (\frac{390+1}{2})^{\text{th}} \text{ item}$$

$$= \text{size of } (195.5)^{\text{th}} \text{ item}$$

Median class = 150 - 160

$$\text{Median} = L + \frac{N/2 - C.F.}{f} \times i$$

$$= 150 + \frac{390/2 - 151}{116} \times 10$$

Here, $L = 150$; $C.F. = 151$

$$f = 116; N = 390; i = 10$$

$$= 150 + \frac{390/2 - 151}{116} \times 10$$

$$= 150 + \frac{195 - 151}{116} \times 10$$

$$= 150 + \frac{440}{116} \times 10 = 150 + \frac{440}{116}$$

$$= 150 + 3.793 =$$

$$> 183.79$$

Date : 28.08.22
 Day : Tuesday

3. Compute median from the following data:

Saving (Rs)	10	20	30	40	50	60	70	80
Cumulative frequency	15	35	64	84	96	120	192	258

Sol:

Given:

Saving (Rs)	0-10	0-20	0-30	0-40	0-50	0-60	0-70	0-80
C.F	15	35	64	84	96	120	192	258

It can be written as,

Saving (Rs)	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80
C.F	15	20	29	20	12	24	72	64

	C.I	E.F	O.F
0 - 10		15	15
10 - 20		35	20
20 - 30		64	29
30 - 40		84	20
40 - 50		96	12

Date : 28.08.022
 Day : Tuesday

	L.F	C.F	
50 - 60	120	24	F
60 - 70	192	72	
70 - 80	256	64	
		256	

$$\begin{aligned}
 \text{Median Class} &= \text{size of } \left(\frac{N+1}{2} \right)^{\text{th}} \text{ item} \\
 &= \text{size of } \left(\frac{256+1}{2} \right)^{\text{th}} \text{ item} \\
 &= \text{size of } (128.5)^{\text{th}} \text{ item}
 \end{aligned}$$

Median class = 60 - 70

$$\text{Median} = L + \frac{N/2 - C.F}{f}$$

Here, $L = 60$; $N = 256$; $C.F = 120$

$$f = 72; i = 10$$

$$= 60 + \frac{256/2 - 120}{72} \times 10$$

$$= 60 + \frac{128 - 120}{72} \times 10$$

$$= 60 + \frac{8}{72} \times 10 = 60 + \frac{80}{72} = 60 + 1.11 = 61.11$$

Date : 25. 08. 022

Day : Thursday

MODE :

The mode is that value which occurs most often in the data, that is with the highest frequency.

Finding of mode :

i) For discrete raw data :-

Maximum repeated date

ii) For discrete frequency data :-

A) By inspection method (o)

B) By grouping and analysis table.

iii) For continuous frequency data :-

$$\text{Mode} = L + \frac{f_1 - f_0}{2f_1 - f_0 - f_2} \times i$$

$$= L + \frac{f_1 - f_0}{2f_1 - f_0 - f_2} \times i$$

Date : 25.08.022

Day : Thursday

where,

L = Lower limit of the modal class.

f_1 = frequency of the modal class

f_0 = frequency of the class preceding
the modal class.

f_2 = frequency of the class succeeding the
modal class.

i = length of the interval.

TYPE - I

① Find the mode of 2, 2, 3, 5, 6, 8, 5, 9, 5.

Maximum repeated value = 5

Mode = 5

2.

Calculate mean, median, and mode of

1, 9, 10, 8, 2, 4, 4, 3, 9, 1, 5, 6, 2, 4

Day : Thursday

Mean :

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

$$= \frac{1+9+10+8+2+4+4+3+9+1+5+6+2+4}{14}$$

$$= 68/14$$

$$\bar{x} = 4.857$$

MEDIAN :

As cending order:

1, 1, 1, 1, 2, 2, 3, 4, 4, 4, 5, 6, 8, 9, 9, 10

$$\text{Median} = \text{size of } \left(\frac{N+1}{2} \right)^{\text{th}} \text{ item}$$

$$= \text{size of } \left(\frac{14+1}{2} \right)^{\text{th}} \text{ item}$$

$$= \text{size of } (7.5)^{\text{th}} \text{ item}$$

$$= \frac{1}{2} (7^{\text{th}} \text{ item} + 8^{\text{th}} \text{ item})$$

$$= \frac{1}{2} (4+4)$$

$$= 8/2 = 4$$

Date : 25.08.22
Day : Thursday

MODE :

Maximum repeated value = 4

$$\text{Mode} = 4$$

MEAN = 4.857

MEDIAN = 4

MODE = 4

TYPE-II

1. Calculate the mode of :

x	3	5	7	9	11	13	15	17
f	2	5	7	8	15	7	5	1

(Q)

Highest Frequency - 2nd highest frequency

$$= 15 - 8$$

$$= 7 \text{ (max)}$$

=> By inspection method

$$\text{Mode} = 11$$

Date : 05.08.022
Day : Thursday

Q. Calculate mode of

Length	2.5	3.0	3.5	4.0	4.5	5.0
No. of nails	10	35	50	45	35	25

Sol: Highest frequency - 2nd highest frequency

$$= 50 - 45$$

$$= 5 \text{ (max)}$$

\Rightarrow By inspection method

$$\text{Mode} = 3.5$$

Number of nails \rightarrow greatest length

Date : 27.08.2022

Day : Saturday

1. Calculate the mode from the following data:

$x :$ 25 | 30 35 40 45 50 55

$y :$ 7 11 17 15 14 10 11

Sol: Inspection method fails

∴ difference between highest two frequency is minimum i.e. $17 - 15 = 2$

GROUPING TABLE:

x	f	I	II	III	IV	V	VI
25	7						
30	11		18				
35	17			28			
40	15		32				
45	14			29			46
50	10		24		39		35
55	11			21			

ANALYSIS TABLE:

x	I	II	III	IV	V	VI	Total
25							
30							1
35	1	1			1	1	4
40	1	1	1	1	1		5
45					1		3
50					1		1
55							

Date : 27.08.22

Day : Saturday

EMPIRICAL FORMULA :-

$$\text{Mode} = 3 \text{ Median} - 2 \text{ Mean}$$

- ① Calculate mean, median and mode of

Marks	5	10	15	20	25	30	35	40	45	50
Frequency	20	43	75	76	72	45	39	9	88	6

$\downarrow A = 25$

x	f	$d = x - A$	fd	C.F
5	20	$5 - 25 = -20$	-400	20
10	43	-15	-645	63
15	75	-10	-750	138
20	76	-5	-380	214
25	72	0	0	286
30	45	5	225	331
35	39	10	390	370
40	9	15	135	379
45	88	20	1760	367
50	6	25	150	473
	473		485	

Date: 27.08.022

Day: Saturday

$$\text{Mean} = \bar{x} = A + \frac{\sum fd}{\sum f}$$

$$= 25 + \frac{485}{473}$$
$$= 25 + 1.025$$

$$\bar{x} = 26.025 //$$

$$\text{Median} = \text{size of } \left(\frac{N+1}{2} \right)^{\text{th}} \text{ item}$$

$$= \text{size of } \left(\frac{473+1}{2} \right)^{\text{th}} \text{ item}$$

$$= \text{size of } (237)^{\text{th}} \text{ item.}$$

$$= 25 //$$

$$\text{Mode} = 3 \text{ median} - 2 \text{ mean}$$

$$= 3(25) - 2(26.025)$$

$$= 75 - 52.05$$

$$= 22.95 //$$

$$\rightarrow \text{Mean} = 26.025$$

$$\text{Median} = 25$$

$$\text{Mode} = 22.95 //$$

Date : 27.08.22

Day : Friday

2. Calculate Mean, Median and Mode of marks

x : 10 20 25 40 50

f : 20 30 50 15 5

$$A = 25$$

x	f	d = x - A	fd	c.F
10	20	10 - 25 = -15	-300	20
20	30	-5	-150	50
25	50	0	0	100
40	15	15	225	115
50	5	25	125	120
	120		-100	

$$\text{Mean} = \bar{x} = A + \frac{\sum fd}{\sum f}$$

$$= 25 + \frac{(-100)}{120}$$

$$= 25 - \frac{100}{120}$$

$$= 25 - 0.833$$

$$\bar{x} = 24.167$$

Date : 27.08.022
Day : Friday

$$\text{Median} = \text{size of } \left(\frac{N+1}{2} \right)^{\text{th}} \text{ item}$$

$$= \text{size of } \left(\frac{120+1}{2} \right)^{\text{th}} \text{ item}$$

$$= \text{size of } \left(\frac{121}{2} \right)^{\text{th}} \text{ item}$$

$$= \text{size of } (60.5)^{\text{th}} \text{ item}$$

$$= 25\text{}/$$

$$\text{Mode} = 3 \text{ median} - 2 \text{ mean}$$

$$= 3(25) - 2(24.167)$$

$$= 75 - 48.334$$

$$= 26.666\text{}/$$

$$\text{Mean} = 24.167$$

$$\text{Median} = 25$$

$$\text{Mode} = 26.666$$

TYPE - III

1. Calculate the mode of the following distribution:-

X :	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45
f:	3	6	10	20	15	5	4	2

Sol: By inspection method

$$\text{Mode class} = 20-25$$

" Highest frequency is 20

$$\text{Mode} = L + \frac{f_1 - f_0}{2f_1 - f_0 - f_2} \times i$$

Here, $L = 20$; $f_1 = 20$; $f_0 = 10$; $f_2 = 15$; $i = 5$

$$\text{Mode} = 20 + \frac{20 - 10}{2(20) - 10 - 15} \times 5$$

$$= 20 + \frac{10}{40 - 25} \times 5$$

$$= 20 + \frac{10}{15} \times 5$$

$$= 20 + 3.333$$

$$\text{Mode} = 23.33$$

Date : 02.09.022

Day : Friday

2. Calculate the mode of the following distribution:

Class Interval	90-100	100-110	110-120	120-130	130-140
Frequency	4	2	18	22	21
	140-150	150-160	160-170	170-180	
	19	10	3	2	

Sol:

Inspection method fails

∴ Difference between two highest frequency

Using empirical formula.

$$\text{Mode} = 3 \text{ median} - 2 \text{ mean}$$

$$i = 10$$

$$A = 135$$

C.I	f	MidValue	$d = \frac{x-A}{i}$	fd	C.F
90-100	4	95	$d = \frac{95-135}{10} = -4$	-16	4
100-110	2	105	-3	-6	6
110-120	18	115	-2	-36	24
120-130	22	125	-1	-22	46
130-140	21	135	0	0	67
140-150	19	145	1	19	86
150-160	10	155	2	20	96
160-170	3	165	3	9	99
170-180	2	175	4	8	101
	101			-24	

Day: Friday

$$\text{Mean} = A + \frac{\sum fd}{\sum f} \times i$$

$$\text{Given } A = 135, \sum fd = -24, \sum f = 101$$
$$\text{Mean} = 135 + \frac{-24}{101} \times 10$$

$$= 135 - \frac{240}{101}$$

$$= 135 - 2.376$$

$$\text{Mean} = 132.624$$

Median class = size of $(\frac{N+1}{2})^{\text{th}}$ item

$$\text{Median} = \text{size of } (\frac{101+1}{2})^{\text{th}} \text{ item}$$

$$= \text{size of } (51)^{\text{th}} \text{ item}$$

$$\text{Median class} = 130 - 140$$

$$\text{Median} = L + \frac{\frac{N}{2} - C.F}{f} \times i$$

Here, $L = 130$; $C.F = 46$; $f = 21$; $i = 10$; $N = 101$

$$\text{Median} = 130 + \left[\frac{101/2 - 46}{21} \right] \times 10$$

Date : 02.09.022

Day : Friday

$$= 130 + \frac{50.5 - 46}{21} \times 10$$

$$= 130 + \frac{4.5}{21} \times 10$$

$$= 130 + 45/21$$

$$= 130 + 2.14$$

$$= 132.14$$

$$\text{Mode} = 3(132.14) - 2(132.624)$$

$$= 396.42 - 265.248$$

$$= 131.172$$

$$\text{Mean} = 132.624$$

$$\text{Median} = 132.14$$

$$\text{Mode} = 131.172$$

Day: Friday

3. Calculate the mean, median and mode from the following data:

Marks	10-20	20-30	30-40	40-50	50-60	60-70	70-80
No. of students	4	12	40	41	27	13	9
	80-90						
	4						

Sol:

Inspect method fails

\therefore difference between two highest frequency is minimum ($41 - 40 = 1$)

Using empirical formula.

$$j = 10 \quad A = 45$$

C.I	f	Midvalue m_c	$d = \frac{x - A}{i}$	fd	C.F
10-20	4	15	$d = \frac{15 - 45}{10} = -3$	-12	4
20-30	12	25	-2	-24	16
30-40	40	35	-1	-40	56
40-50	41	45	0	0	97
50-60	27	55	1	27	124
60-70	13	65	2	26	137
70-80	9	75	3	18	146
80-90	4	85	4	16	150
	150			11	

$$\text{Mean} = A + \frac{\sum fd}{\sum f} \times i$$

$$= 45 + \frac{11}{150} \times 10$$

$$= 45 + \frac{110}{150}$$

$$= 45 + 0.73$$

$$= 45.733$$

$$\text{Median class} = \text{size of } \left(\frac{N+1}{2} \right)^{\text{th}} \text{ item}$$

$$= \text{size of } \left(\frac{150+1}{2} \right)^{\text{th}} \text{ item}$$

$$= \text{size of } \left(\frac{151}{2} \right)^{\text{th}} \text{ item}$$

$$= \text{size of } (75.5)^{\text{th}} \text{ item}$$

$$\text{Median class} = 40 - 50$$

$$\text{Median} = L + \frac{N/2 - C.F}{f} \times i$$

$$\text{Here: } L = 40 ; C.F = 56 ; N = 150 ; f = 41$$

$$i = 10$$

$$= 40 + \frac{150/2 - 56}{41} \times 10$$

$$= 40 + \frac{75 - 56}{41} \times 10$$

Date: 02.09.022

Day: Friday

$$= 40 + \frac{19}{41} \times 10$$

$$= 40 + \frac{190}{41}$$

$$= 40 + 4.634$$

$$= 44.634.$$

$$\text{Mode} = 3(44.634) - 2(45.733)$$

$$= 133.902 - 91.466$$

$$= 42.436 //$$

$$\text{Mean} = 45.733$$

$$\text{Median} = 44.634$$

$$\text{Mode} = 42.436$$

Date: 06.09.02

Day: Tuesday

CLASS TEST:-

1. Calculate the mean, median and mode from the following data:

$X :$ 5 6 8 10 13 15 17 25

$f :$ 15 22 20 18 65 45 13 2

$$A = 10$$

x	f	$d = x - A$	fd	C.F
5	15	-5	-75	15
6	22	-4	-88	37
8	20	-2	-40	57
10	18	0	0	75
13	65	3	195	140
15	45	5	225	185
17	13	7	91	198
25	2	15	30	200
$\Sigma f = 200$			$\Sigma fd = 338$	

$$\text{Mean} = A + \frac{\Sigma fd}{\Sigma f}$$

$$= 10 + \frac{338}{200}$$

$$= 10 + 1.69$$

$$= 11.69 //$$

Date : 06.09.02
Day : Tuesday

$$\begin{aligned}\text{Median} &= \text{size of } \left(\frac{N+1}{2}\right)^{\text{th}} \text{ item} \\ &= \text{size of } \left(\frac{200+1}{2}\right)^{\text{th}} \text{ item} \\ &= \text{size of } \left(\frac{201}{2}\right)^{\text{th}} \text{ item} \\ &= \text{size of } (100.5)^{\text{th}} \text{ item} \\ &= 13 //\end{aligned}$$

$$\text{Mode} = 3 \text{ Median} - 2 \text{ Mean}$$

$$\begin{aligned}&= 3(13) - 2(11.69) \\&= 39 - 23.38 \\&= 15.62 //\end{aligned}$$

$$\text{Mean} = 11.69$$

$$\text{Median} = 13$$

$$\text{Mode} = 15.62$$

d. Calculate mean, median and mode for the following data :

Mid-value	10	20	30	40	50	60	70	80
frequency	2	3	5	8	10	3	2	3

$$I = 10 \quad A = 40$$

C.I	f	Mid value	$d = \frac{x-A}{I}$	fd	C.F
5 - 15	2	10	$d = \frac{10-40}{10} = -3$	-6	2
15 - 25	3	20	-2	-6	5
25 - 35	5	30	-1	-5	10
35 - 45	8	40	0	0	18
<u>45 - 55</u>	<u>10</u>	<u>50</u>	1	10	28
55 - 65	3	60	2	6	31
65 - 75	2	70	3	6	33
75 - 85	3	80	4	12	36
	$N = 36$			$\sum fd = 17$	

$$\text{Mean} = A + \frac{\sum fd}{N} \times i$$

$$= 40 + \frac{17}{36} \times 10$$

$$= 40 + \frac{170}{36}$$

$$= 40 + 4.72$$

$$= 44.72 //$$

$$\text{Median} = \text{size of } \left(\frac{N+1}{2} \right)^{\text{th}} \text{ item}$$

$$= \text{size of } \left(\frac{36+1}{2} \right)^{\text{th}} \text{ item}$$

$$\text{Median} = \text{size of } (18.5)^{\text{th}} \text{ item}$$

$$\text{Class} = 45 - 55$$

Date : 08.09.2022
Day : Tuesday

$$\text{Median} = L + \frac{N/2 - C.F}{f} \times i$$

Here; $L = 45$; $N = 36$; $C.F = 18$; $f = 10$; $i = 10$

$$= 45 + \frac{36/2 - 18}{10} \times 10$$

$$= 45 + \frac{18 - 18}{10} \times 10$$

$$= 45 + 0$$

$$\text{Median} = 45 //$$

$$\text{Mode} = 3\text{median} - 2\text{mean}$$

$$= 3(45) - 2(44.72)$$

$$= 135 - 89.44$$

$$= 45.56 //$$

$$\text{Mean} = 44.72$$

$$\text{Median} = 45$$

$$\text{Mode} = 45.56$$

Date : 06.09.02
 Day : Tuesday

3. Calculate the mean, median and mode for the

C.I	0-20	20-40	40-60	60-80	80-100	100-120	120-140
C.F	12	20	32	50	60	68	75

$$i = 20$$

$$A = 70$$

C.I	C.F.	f	Midvalue	$d = \frac{m - A}{i}$	fd
0-20	12	12	10	$d = \frac{10 - 70}{20} = -3$	-36
20-40	20	8	30	-2	-16
40-60	32	12	50	-1	-12
60-80	50	18	70	0	0
80-100	60	10	90	1	10
100-120	68	8	110	2	16
120-140	75	7	130	3	21
		$\sum f = 75$			$\sum fd = -17$

$$\text{Mean} = A + \frac{\sum fd}{\sum f} \times i$$

$$= 70 + \left(\frac{-17}{75} \right) \times 20$$

$$= 70 - \frac{340}{75}$$

$$= 70 - 4.533$$

$$= 65.467$$

Date : 06.09.22
Day : Tuesday

Median = size of $(\frac{N+1}{2})^{\text{th}}$ item

= size of $(\frac{75+1}{2})^{\text{th}}$ item

= size of $(38)^{\text{th}}$ item

Median = 60 - 80

class

Here; Median = $L + \frac{N/2 - C.F}{f} \times i$

$L = 60; N = 75; C.F = 32; f = 18; i = 20$

$$\text{Median} = 60 + \frac{75/2 - 32}{18} \times 20$$

$$= 60 + \frac{37.5 - 32}{18} \times 20$$

$$= 60 + \frac{5.5}{18} \times 20$$

Mode = 3 median - 2 mean

$$= 60 + \frac{110}{18}$$

$$= 3(66.111) - 2(65.467)$$

$$= 60 + 6.111$$

$$= 198.333 - 130.934$$

$$= 66.111$$

$$= 67.399$$

Mean = 65.467

Median = 66.111

Mode = 67.399

Date : 10. 09. 022
Day : Saturday

COMBINED A.M:-

If we know the arithmetic means of two or more group with there number of items, then we compute the mean of combine group by,

$$\bar{x} = \frac{n_1 \bar{x}_1 + n_2 \bar{x}_2 + \dots + n_k \bar{x}_k}{n_1 + n_2 + \dots + n_k}$$

where, n_1 = No. of item in group 1

n_2 = No. of item in group 2

\vdots
 n_k = No. of item in group k

\bar{x}_1 = A.M of group 1

\bar{x}_2 = A.M of group 2

\vdots
 \bar{x}_k = A.M of group k

\bar{x} = A.M of combined groups 1, 2, 3, ... k.

Date : 10.09.022

Day : Saturday

1. The mean height of 25 male workers in a factory is 61 cm and the mean height of 35 female workers in the same factory is 58 cm find the combined mean height of 60 workers in the factory:-

Sol:

Given :

$$\text{Total male workers} = n_1 = 25$$

$$\text{Total female workers} = n_2 = 35$$

$$\text{Average height of male workers} = \bar{x}_1 = 61 \text{ cm}$$

$$\text{Average height of female workers} = \bar{x}_2 = 58 \text{ cm}$$

Combined height of?

$$60 \text{ workers} \left\} = \bar{x} = \frac{n_1 \bar{x}_1 + n_2 \bar{x}_2}{n_1 + n_2}$$

$$= \frac{25(61) + 35(58)}{25 + 35}$$

$$= \frac{1525 + 2030}{60}$$

$$= \frac{3555}{60}$$

$$\bar{x} = 59.25 \text{ cm,}$$

Sol:

Date : 10.09.022

Day : Saturday

- Q. In the class of 50 students, 10 have fail, and the average mark is 25. The total marks secured by the entire class 2810 find the average mark of those who has pass:

Sol:

$$\text{Total students} = n = 50$$

$$\text{Total marks} = \sum x = 2810$$

$$\text{Total failed students} = n_1 = 10$$

$$\text{Total passed students} = n_2 = 50 - 10 = 40$$

$$\text{Average of failed students} = \bar{x}_1 = 25$$

$$\text{Average of passed students} = \bar{x}_2 = ?$$

Combined mean,

$$\bar{x} = \frac{n_1 \bar{x}_1 + n_2 \bar{x}_2}{n_1 + n_2}$$

$$\Rightarrow \frac{\sum x}{n} = \frac{10(25) + 40 \bar{x}_2}{10 + 40}$$

$$\frac{2810}{50} = \frac{250 + 40 \bar{x}_2}{50}$$

$$2810 - 250 = 40 \bar{x}_2$$

$$\frac{2560}{40} = \bar{x}_2$$

$$2560 = 40 \bar{x}_2$$

$$64 = \bar{x}_2$$

Date : 10.09.022
Day : Saturday

3. The mean wage of 150 female in a factory is $Rs = 2750$ and the mean wage of 50 male workers in the same factory is $\text{₹}2500$. Find the combine wage of 200 workers in the factory :-

Sol:

$$\text{Total male workers } n_1 = 50$$

$$\text{Total female workers } n_2 = 150$$

$$\text{Average wage of male workers } \bar{x}_1 = 2500$$

$$\text{Average wage of female workers } \bar{x}_2 = 2750$$

$$\begin{aligned} \text{Combine wage of } \\ \text{200 workers} \end{aligned} = \bar{x} = \frac{n_1 \bar{x}_1 + n_2 \bar{x}_2}{n_1 + n_2}$$

$$= \frac{50(2500) + 150(2750)}{50 + 150}$$

$$= \frac{125000 + 412500}{200}$$

$$= \frac{537500}{200}$$

$$\bar{x} = 2687.5$$

Date: 10. 09. 022
Day: Saturday

4. The mean of 200 items is 50. Later on it was discovered that 192 was wrongly taken as 92. find the correct mean:-

Sol: Mean of 200 items = 50 = \bar{x}

$$W.k.T \bar{x} = \frac{\sum x}{n}$$

$$50 = \frac{\sum x}{200}$$

$$50 \times 200 = \sum x$$

$$10,000 = \sum x$$

$$\text{Error} = \text{Correct value} - \text{Wrong value}$$

$$= 192 - 92$$

$$= 100$$

$$\text{Correct A.M} = \bar{x} = \frac{\sum x + 100}{n}$$

$$= \frac{10000 + 100}{200}$$

$$= \frac{10100}{200}$$

$$\boxed{\bar{x} = 50.5}$$

Date : 10.09.022
Day : Saturday

5. The mean marks of 100 students were found to be 40. Later it was discovered that a score of 53 was misread as 83. Find the correct mean corresponding to the correct score?

Sol: Mean of 100 students = 40 = \bar{x}

$$\text{W.R.T } \bar{x} = \frac{\sum x}{n}$$

$$40 = \frac{\sum x}{100}$$

$$40 \times 100 = \sum x$$

$$4000 = \sum x$$

$$\text{Error} = \text{Correct Value} - \text{Wrong Value}$$

$$= 53 - 83$$

$$= -30$$

$$\text{Correct A.M} = \bar{x} = \frac{\sum x - 30}{n}$$

$$= \frac{4000 - 30}{100}$$

$$= \frac{3970}{100} \quad \bar{x} = 39.7.$$

Date: 13. 09. 022

Day: Tuesday

GEOMETRIC MEAN:

Suppose x_1, x_2, \dots, x_n be n observations.

then

$$G.M = \sqrt[n]{x_1 \cdot x_2 \cdot x_3 \cdots x_n}$$
$$= (x_1 \cdot x_2 \cdot x_3 \cdots x_n)^{1/n}$$

i) For discrete raw data:-

$$G.M = \text{Antilog of } \frac{1}{n} \sum_{i=1}^n \log x_i$$

ii) For discrete frequency data:

$$G.M = \text{Antilog of } \frac{\sum f \log x}{\sum f}$$

iii) For continuous frequency data:

$$G.M = \text{Antilog of } \frac{\sum f \log m}{\sum f}$$

where m is midvalues of the class intervals.

Date : 18.09.022
Day : Tuesday

- ①. Find the G.M of the following quantities:
2, 8, 32, 36, 6

Sol:

x	$\log x$
2	0.3010
8	0.9030
32	1.5051
36	1.5563
6	0.7781
N = 5	5.0435

$$\begin{aligned} \text{G.M} &= \text{Antilog} \left(\frac{1}{n} \sum \log x \right) \\ &= \text{Antilog} \left[\frac{1}{5} (5.0435) \right] \\ &= \text{Antilog} [1.0087] \\ &= 10^{(1.0087)} \\ &= 10.2023 // \end{aligned}$$

- ②. Find the G.M of the following quantities:-
82, 93, 50, 54, 72,

x	$\log x$
82	1. 9138
93	1. 9684
50	1. 6990
54	1. 7324
72	1. 8573
$N = 5$	9. 1709

$$\begin{aligned}
 \text{G.m} &= \text{Antilog} \left(\frac{1}{n} \sum \log x \right) \\
 &= \text{Antilog} \left[\frac{1}{5} (9.1709) \right] \\
 &= \text{Antilog} [1.8341] \\
 &= 10^{1.8341} \\
 &= 68.2495 //
 \end{aligned}$$

3. Find the G.m of the following quantities:

9574, 475, 75, 0.8, 0.08, 0.005, 0.0009

x	$\log x$
2574	3.4106
475	2.6767
75	1.8751
5	0.6990
0.8	-0.0970
0.08	-1.0970
0.005	-2.3010
0.0009	-3.0457
<hr/>	
$N = 8$	2.1207

$$G.m = \text{Antilog of } \left(\frac{1}{n} \times \log \right)$$

$$= \text{Antilog of } \left[\frac{1}{8} (2.1207) \right]$$

$$= \text{Antilog of } (0.2650)$$

$$= 10^{(0.2650)}$$

$$= 1.8407 //$$

TYPE-II

4. Compute the G.M from

Category	I	II	III	IV	V	VI	VII	VIII
Monthly Income	500	3750	3000	750	600	400	300	200
No. of employees	2	4	6	8	6	180	10	50

x	f	$\log x$	$f \log x$
500	2	2.6990	5.398
3750	4	3.5740	14.296
3000	6	3.4771	20.8626
750	8	2.8751	23.0008
600	6	2.7782	16.6686
400	100	2.6020	260.2
300	10	2.4771	24.771
200	50	2.3010	115.05
	186	18.1527	488.997

$$G.M. = \text{Antilog of } \frac{\sum f \log x}{\sum f}$$

$$= \text{Antilog of } \frac{480.247}{186}$$

$$= \text{Antilog of } (2.5819)$$

$$= \frac{1}{10} (2.5819)$$

$$= 381.856$$

⑤ Find the geometric mean for the following data:

x	1000	80	40	750	100	150	120	60
f	1	50	25	2	3	4	3	5

x	f	$\log x$	$f \log x$
1000	1	3	3
80	50	1.9031	95.155
40	25	1.6021	40.0525
750	2	2.8751	5.7502
100	3	2	6
150	4	2.1761	8.7044
120	3	2.0792	6.2376

60	5	1.7781	8.8905
	93		173.7902

$$G.M = \text{Antilog of } \frac{\sum f \log x}{\sum f}$$

$$= \text{Antilog of } \frac{173.7902}{93}$$

$$= \text{Antilog} (1.8687)$$

$$= 10^{(1.8687)}$$

$$= 73.9095 //$$

TYPE - III

b. Compute the G.M

Class	0-10	10-20	20-30	30-40	40-50
frequency	5	7	15	25	8

Class Interval	f	m	$\log m$	$f \log m$
0 - 10	5	5	0.6990	3.495
10 - 20	7	15	1.1761	8.2327
20 - 30	15	25	1.3979	20.9685
30 - 40	25	35	1.5441	38.6025
40 - 50	8	45	1.6532	13.2256
	60			84.5243

$$G.M = \text{Antilog of } \frac{\sum f \log m}{\sum f}$$

$$= \text{Antilog of } \frac{84.5243}{60}$$

$$= \text{Antilog } (1.4087)$$

$$= 10^{(1.4087)}$$

$$= 25.6271$$

7. Compute the G.M:

Marks

0 - 10

10 - 20

20 - 30

30 - 40

40 - 50

No. of Students

8

12

18

8

6

Class Interval	f	Midvalue x	$\log m$	$f \log m$
0 - 10	8	5	0.6990	5.592
10 - 20	12	15	1.1761	14.1132
20 - 30	18	25	1.3979	25.1622
30 - 40	8	35	1.5441	12.3528
40 - 50	6	45	1.6532	9.9192
	52			67.1394

$$G.M = \text{Antilog of } \frac{\sum f \log m}{\sum f}$$

$$= \text{Antilog of } \frac{67.1394}{52}$$

$$= \text{Antilog } (1.2911)$$

$$= 10^{(1.2911)}$$

$$= 19.5478$$

Date: 16.09.02

Day: Friday

HARMONIC MEAN:

If x_1, x_2, \dots, x_n are n items,

then Harmonic mean is given by

$$\text{ii) } H.M = \frac{n}{\frac{1}{x_1} + \frac{1}{x_2} + \dots + \frac{1}{x_n}} = \frac{n}{\sum \frac{1}{x_i}}$$

ii) For discrete Frequency:

$$H.M = \frac{\sum f}{\sum f \left(\frac{1}{x_i} \right)}$$

iii) For Continuous Frequency:

$$H.M = \frac{\sum f}{\sum f \left(\frac{1}{m_i} \right)}$$

where m_i is the midvalue of the class.

Date: 16.09.022

Day: Friday

Ques. 1. Find the Harmonic Mean:

6, 15, 35, 40, 900, 520, 300, 400, 1800, 2000

x	$\frac{1}{x}$
6	$\frac{1}{6} = 0.1667$
15	$\frac{1}{15} = 0.0667$
35	$\frac{1}{35} = 0.0286$
40	$\frac{1}{40} = 0.025$
900	$\frac{1}{900} = 0.0011$
520	$\frac{1}{520} = 0.0019$
300	$\frac{1}{300} = 0.0033$
400	$\frac{1}{400} = 0.0025$
1800	$\frac{1}{1800} = 0.0006$
2000	$\frac{1}{2000} = 0.0005$
$\sum \frac{1}{x} = 0.2969$	

$$H.M = \frac{n}{\sum \frac{1}{x}}$$

$$= \frac{10}{0.2969}$$

$$= 33.6813 //$$

2.

Find the H.M:

$$1, 0.5, 10, 45, 175, 0.01, 4, 11.2$$

x	y_x
1	$y_1 = 1$
0.5	$y_{0.5} = 2$
10	$y_{10} = 0.1$
45	$y_{45} = 0.0222$
175	$y_{175} = 0.0057$
0.01	$y_{0.01} = 100$
4	$y_4 = 0.25$
11.2	$y_{11.2} = 0.0893$
$\sum y_x = 103.3772$	

$$H.M = \frac{n}{\sum y_x}$$

$$= \frac{8}{103.3772}$$

$$= 0.07739$$

Date: 16.09.022

Day: Friday

TYPE-II
3.

Find the H.M:-

x :	10	12	14	16	18	20
f :	5	18	20	10	6	1

x	f	$\frac{1}{x}$	$f(\frac{1}{x})$
10	5	0.1	0.5
12	18	0.0833	1.4994
14	20	0.0714	1.428
16	10	0.0625	0.625
18	6	0.0556	0.3336
20	1	0.05	0.05
	60		$\sum f(\frac{1}{x}) = 4.431$

$$\text{H.M} = \frac{60}{4.431} \quad (\text{H.M} = \frac{\sum f}{\sum f(\frac{1}{x})})$$
$$= 13.5257 //$$

Date : 19.09.022

Day : Monday

2. Calculate the H.M following data :

x : 10 20 25 40 50

f : 20 30 50 15 5

x	f	$\frac{1}{x}$	$f(\frac{1}{x})$
10	20	$\frac{1}{10} = 0.1$	2
20	30	$\frac{1}{20} = 0.05$	1.5
25	50	$\frac{1}{25} = 0.04$	2
40	15	$\frac{1}{40} = 0.025$	0.375
50	5	$\frac{1}{50} = 0.02$	0.1
	120		5.975

$$H.M = \frac{120}{5.975}$$

$$= 20.0837 //$$

Type - II
1.

Calculate the A.M from the given data:

Marks	15-25	25-35	35-45	45-55	55-65	65-75	75
No. of Students	4	11	19	14	0		
						2	

Sol:

Interval	f	m	y_m	$f(y_m)$
15 - 25	4	20	0.05	0.2
25 - 35	11	30	0.0333	0.3663
35 - 45	19	40	0.025	0.475
45 - 55	14	50	0.02	0.28
55 - 65	0	60	0.0167	0
65 - 75	2	70	0.0143	0.0286
	50			1.3499

$$H.M = \frac{50}{1.3499}$$

$$= 37.0398$$

Date: 19.09.022

Day: Monday

Calculate Harmonic mean of

Marks

10 - 20	20 - 30	30 - 40	40 - 50	50 - 60
No. of Students	4	6	10	7

Interval	f	m	$\frac{1}{m}$	$f(\frac{1}{m})$
10 - 20	4	15	$\frac{1}{15} = 0.0667$	0.2668
20 - 30	6	25	$\frac{1}{25} = 0.04$	0.24
30 - 40	10	35	$\frac{1}{35} = 0.0286$	0.286
40 - 50	7	45	$\frac{1}{45} = 0.0222$	0.1554
50 - 60	3	55	$\frac{1}{55} = 0.0182$	0.0546
	30			1.0028

$$H.M = \frac{30}{1.0028}$$

$$= 29.9162 //$$