DAY 2

In last section, we have discussed about direct method of Arithmetic Mean. In this section, we shall discuss about **Assumed Mean Method** of finding Arithmetic Mean.

Assumed Mean Method:

In direct method if there are larger values like 125, 213, 189 etc. then its difficult to multiply such large values, to solve this problem, we have **Assumed Mean** method.

- Here first we find mid values of class intervals ($\boldsymbol{x}$)
- From mid values ($\boldsymbol{x}$), we assume any value, written as **A** (**either in x or not**).
- Then we find deviations $\boldsymbol{d = x - A}$
- Multiply $\boldsymbol{d}$ by given frequency $\boldsymbol{f}$ to find $\boldsymbol{fd}$
- Then add values of $\boldsymbol{f}$ and $\boldsymbol{fd}$, replace in the following formula:

$$\bar{X} = A + \frac{\Sigma fd}{\Sigma f} \quad \text{where A = Assumed Value, } d = x - A$$

1. Find the mean of the following distribution:

Class Interval	**110-120**	**120-130**	**130-140**	**140-150**	**150-160**
Frequency	**26**	**19**	**12**	**18**	**25**

Sol:-

Class-Interval	f	Mid-value x	$d = x - A$	fd
110-120	26	115	$115 - \mathbf{135} = -20$	-520
120-130	19	125	$125 - \mathbf{135} = -10$	-190
130-140	12	**135 A**	$135 - \mathbf{135} = 0$	0
140-150	18	145	$145 - \mathbf{135} = 10$	180
150-160	25	155	$155 - \mathbf{135} = 20$	500
Total	N=$\Sigma f = 100$			$\Sigma fd = -30$

$$\bar{X} = A + \frac{\Sigma fd}{\Sigma f}$$

$$= 135 + \frac{-30}{100} = 135 - 0.3 = 134.7$$

2. Find the mean of the following distribution:

Marks	**0-15**	**15-30**	**30-45**	**45-60**	**60-75**	**75-90**
Students	**14**	**25**	**13**	**11**	**15**	**12**

Sol:-

Class-Interval	f	Mid-value x	$d = x - A$	fd
0-15	14	7.5	$7.5 - \mathbf{37.5} = -30$	-420

15-30	25	22.5	$22.5 - \mathbf{37.5} = -15$	-375
30-45	13	**37.5 A**	$37.5 - \mathbf{37.5} = 0$	0
45-60	11	52.5	$52.5 - \mathbf{37.5} = 15$	165
60-75	15	67.5	$67.5 - \mathbf{37.5} = 30$	450
75-80	12	82.5	$82.5 - \mathbf{37.5} = \mathbf{45}$	540
Total	N=$\Sigma f = 90$			$\Sigma fd = 360$

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

$$= 37.5 + \frac{360}{90} = 37.5 + 4 = 41.5$$

3. Find the mean of the following distribution:

Class Interval	**100-200**	**200-300**	**300-400**	**400-500**	**500-600**	**600-700**
Frequency	**11**	**10**	**7**	**4**	**3**	**5**

Sol:-

Class-Interval	f	Mid-value x	$d = x - \text{A}$	fd
100-200	11	150	$150 - \mathbf{450} = -300$	-3300
200-300	10	250	$250 - \mathbf{450} = -200$	-2000
300-400	7	350	$350 - \mathbf{450} = -100$	-700
400-500	4	**450 A**	$450 - \mathbf{450} = 0$	0
500-600	3	550	$550 - \mathbf{450} = 100$	300
600-700	5	650	$650 - \mathbf{450} = 200$	1000
Total	N=$\Sigma f = 40$			$\Sigma fd = -4700$

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

$$= 450 + \frac{-4700}{40} = 450 - 117.5 = 332.5$$

STEP DEVIATION METHOD:

This method is applicable when terms of d are divided by a single common factor. This is Deviation method can be further simplified on dividing the deviation by width of the class interval.

- All process to find Arithmetic Mean is same as in Assumed Mean upto d.
- Divide terms of d **with common factor**
- Then add and replace in the following formula:

$$\bar{\mathbf{X}} = \mathbf{A} + \frac{\Sigma \boldsymbol{fd'}}{\Sigma \boldsymbol{f}} \times \boldsymbol{i} \quad ; \quad \boldsymbol{d'} = \frac{\boldsymbol{x} - \mathbf{A}}{\boldsymbol{i}}$$

i = width of the class interval

1. Find the mean of the following distribution by Step Deviation Method:

Class Interval	**10-25**	**25-40**	**40-55**	**55-70**	**70-85**	**85-100**
Frequency	**2**	**3**	**7**	**6**	**6**	**6**

Sol:-

Class-Interval	f	Mid-value x	$d = x - \mathrm{A}$	$\boldsymbol{d' = \frac{d}{i=15}}$	fd'
10-25	2	17.5	$17.5 - \mathbf{47.5} = -30$	-2	-4
25-40	3	32.5	$32.5 - \mathbf{47.5} = -15$	-1	-3
40-55	7	**47.5 A**	$47.5 - \mathbf{47.5} = 0$	0	0
55-70	6	62.5	$62.5 - \mathbf{47.5} = 15$	1	6
70-85	6	77.5	$77.5 - \mathbf{47.5} = 30$	2	12
85-100	6	92.5	$92.5 - \mathbf{47.5} = 45$	3	18
Total	N=$\Sigma f = 30$				$\Sigma fd' = 29$

$$\bar{X} = \mathrm{A} + \frac{\Sigma fd'}{\Sigma f} \times i$$

$$= 47.5 + \frac{29}{30} \times 15 = 47.5 + 14.5 = 62$$

2. Find the mean of the following distribution by Step Deviation Method:

Class Interval	**25-35**	**35-45**	**45-55**	**55-65**	**65-75**	**75-85**
Frequency	**7**	**9**	**8**	**10**	**11**	**5**

Sol:-

Class-Interval	f	Mid-value x	$d = x - \mathrm{A}$	$\boldsymbol{d' = \frac{d}{i=10}}$	fd'
25-35	7	30	$30 - \mathbf{60} = -30$	-3	-21
35-45	9	40	$40 - \mathbf{60} = -20$	-2	-18
45-55	8	50	$50 - \mathbf{60} = -10$	-1	-8
55-65	10	**60 A**	$60 - \mathbf{60} = 0$	0	0
65-75	11	70	$70 - \mathbf{60} = 10$	1	11
75-85	8	80	$80 - \mathbf{60} = 20$	2	16
Total	N =$\Sigma f = 50$				$\Sigma fd' = -26$

$$\bar{X} = \mathrm{A} + \frac{\Sigma fd'}{\Sigma f} \times i$$

$$= 60 + \frac{-26}{50} \times 10 = 60 - 5.2 = 54.8$$

EXERCISE

1. Ex 14.1, Do Q 1,2,4,6,7,9 with Assumed Mean Method and Step Deviation Method.