

CHAPTER ONE

STATISTICS – PART TWO

Determination of the mean by the use of an assumed mean:

- This is another method of finding the mean.
- For example if we want to find the mean of 1,3,4,5 and 8, using an assumed mean, we go through these steps:

1. We write the numbers in a column form i.e.

1
3
4
5
8

2. We next choose one of these numbers as the assumed mean. This number must be the middle number or must be positioned around the middle. For the given example, we therefore choose 4 as the assumed mean.

3. We then calculate the deviation of each of these numbers, with reference to the assumed mean.

4. The deviation (d) of a given number is given by $d = x - \text{assumed mean}$, where $x = \text{the number}$. The assumed mean is represented by the letter A. i.e.

Number, X	deviation $d = (x - A)$ $d = (x - 4)$
1	-3
3	-1
4	0
8	4

5

1

$$\sum d = 1$$

5. We then find the total deviation i.e. $\sum d$.

6. We then calculate the mean using the formula $\text{mean} = A + \frac{\sum d}{N}$, where A = assumed mean and N = the number of items or numbers under consideration, which is 5 in the given example.
7. For the given example, the mean
 $= 4 + \frac{1}{5} = 4 + 0.2 = 4.2$.

NB: The deviation $d = (x - A) = (x - 4)$ in the given example.

- If the number $x = 1$, then $d = (1 - 4) = -3$.
- Also if the number $x = 5$, then $d = (5 - 4) = 1$.
- Lastly if the number $x = 8$, then $d = (8 - 4) = 4$

Q1. Find the mean of 5, 7, 5, 4, 3, 8 by using an assumed mean.

Solution

Number, X	deviation $d = (x - 5)$
5	0
7	2
5	0
4	- 1
3	- 2
8	3

$$\sum d = 2$$

Since there are six numbers $\Rightarrow N = 6$.

$$\text{The mean } \bar{x} = A + \frac{\sum d}{N}$$

$$\Rightarrow \bar{x} = 5 + \frac{2}{6} = 5 + \frac{1}{3} = 5 + 0.33$$

$$\Rightarrow \bar{x} = 5.33$$

Determination of the mean by means of an assumed mean, when frequencies are involved:

Whenever frequencies are involved, the mean is

$$\text{determined using the formula } \bar{x} = A + \frac{\sum Fd}{\sum F}$$

Q2. Find the mean of this given data, by using an assumed mean.

X	1	2	5	8

F 6 2 4 3

Solution

Let assumed mean = 5

X	d = (x - A)	F	Fd
1	- 4	6	- 24
2	- 3	2	- 6
5	0	4	0
8	3	3	9

$$\Sigma f = 15 \quad \Sigma Fd = -21$$

$$\begin{aligned} \text{The mean} = \bar{x} &= A + \frac{\Sigma Fd}{\Sigma f} \\ &= 5 + \frac{(-21)}{15} \\ &= 5 + (-1.4) = 5 - 1.4 = 3.6 \end{aligned}$$

NB: To get the value of the Fd, we multiply the d by F.

Q3

.	Age / yrs	2	1	3	5
	Freq	3	1	2	3

The given table shows the age distribution of a group of friends. By using an assumed mean, calculate the mean

Solution

Let assumed mean = 3.

Age x	d = (x - 3)	F	Fd
2	- 1	3	- 3
1	- 2	1	- 2
3	0	2	0
5	2	3	6

$$\text{Mean} = A + \frac{\sum Fd}{\sum F} = 3 + \frac{1}{9} = 3.1.$$

Determination of the arithmetic mean or the mean from a grouped data, using an assumed mean:

Q1.

Weight / kg	2 – 4	5 – 7	8 – 10	11 -13
Freq.	5	8	10	2

The weights of stones used for a project are as shown in the given table. By means of an assumed mean, calculate the mean.

Solution

Let assumed mean = 6, since it is located around the middle of the class mark Column.

Group or Weight /kg	Class Mark (x)	Freq. F	d = (x – 6)	Fd.
2 – 4	3	5	- 3	- 15
5 – 7	6	8	0	0
8 – 10	9	10	3	30
11 – 13	12	2	6	12

$$\sum F = 25$$

$$\sum Fd = 27$$

$$\text{The mean} = A + \frac{\sum Fd}{\sum F} = 6 + \frac{27}{25} = 6 + 1.08 = 7.08.$$

Q2. You are given the following numbers

2	9	3	2	4	6	6	10
2	2	2	4	4	3	8	9
9	9	4	3	4	7	8	10

By using an assumed mean and the grouping 0 – 2, 2 – 5 and so on , calculate the mean.

Solution N/B: Assumed mean = 4

Group x	Class mark F	Freq.	d = (x - 4)	Fd
0 – 2	1	5	- 3	- 15
3 – 5	4	8	0	0
6 – 8	7	5	3	15
9 – 11	10	6	6	36
		$\Sigma F = 24$	$\Sigma Fd = 36$	

The arithmetic mean = $A + \frac{\Sigma Fd}{\Sigma F} = 4 + \frac{36}{24} = 4 + 1.5 = 5.5$.

Q3. The given table shows the marks scored in a mathematics class work given by a teacher.

45	68	65	67	61
55	79	60	64	68
59	67	64	63	50
54	64	76	57	68
72	53	80	74	70
59	71	63	55	57

By using the grouping 45 – 49, 50 – 54 etc, determine the mean by using an assumed mean.

Solution

Let assumed mean = 62

Group	Class mark X	Freq. F	d = (x – 62)	Fd
45 – 49	47	1	- 15	- 15
50 – 54	52	3	- 10	- 30
55 – 59	57	6	- 5	- 30
60 – 64	62	7	0	0
65 – 69	67	6	5	30

70 – 74	72	4	10	4
75 – 79	77	2	15	30
80 – 84	82	1	20	20

$$\sum F = 30$$

$$\sum Fd = 45$$

$$\text{Mean} = A + \frac{\sum Fd}{\sum f} = 62 + \frac{45}{30} = 62 + 1.5 = 63.5.$$

Q4. By means of an assumed mean, calculate the mean of the following group of numbers:

10	11	10	12	14
10	11	10	15	13
13	14	13	9	9
15	12	13	15	14

Solution

Let assumed mean = 12

Number X	Deviation d = (x – 12)	Freq. F	Fd
9	-3	2	-6
10	-2	4	-8
11	-1	2	-2
12	0	2	0
13	1	4	4
14	2	3	6
15	3	3	9

$$\sum F = 20$$

$$\sum Fd = 3$$

$$\text{Mean} = A + \frac{\sum Fd}{\sum F} = 12 + \frac{3}{20} = 12 + 0.15 = 12.15$$