

## 6

## Statistics

## Practice Set 6.1

1. The following table shows the number of students and the time they utilized daily for their studies. Find the mean time spent by students for their studies by direct method.

|                 |     |     |     |     |      |
|-----------------|-----|-----|-----|-----|------|
| Time (hrs.)     | 0-2 | 2-4 | 4-6 | 6-8 | 8-10 |
| No. of students | 7   | 18  | 12  | 10  | 3    |

Soln:-

| class | class mark<br>( $x_i$ ) | NO. of students<br>Frequency<br>( $f_i$ ) | Class mark $\times$ frequency<br>( $x_i \times f_i$ ) |
|-------|-------------------------|---|---|
| 0-2   | 1                       | 7   | 7   |
| 2-4   | 3                       | 18  | 54  |
| 4-6   | 5                       | 12  | 60  |
| 6-8   | 7                       | 10  | 70  |
| 8-10  | 9                       | 3   | 27  |
|       |                         | $\Sigma f_i = 50$                         | $\Sigma f_i x_i = 218$                                |

$$\begin{aligned} \text{Now, Mean} &= \frac{\Sigma f_i x_i}{\Sigma f_i} \\ &= \frac{218}{50} \end{aligned}$$

$$= \frac{109 \times 2}{25 \times 2}$$

$$= \frac{109}{25}$$

$$\text{Mean} = 4.36 \text{ Hours}$$

2. In the following table, the toll paid by drivers and the number of vehicles is shown. Find the mean of the toll by 'assumed mean' method.

|                 |         |         |         |         |         |
|-----------------|---------|---------|---------|---------|---------|
| Toll (Rupees)   | 300-400 | 400-500 | 500-600 | 600-700 | 700-800 |
| No. of vehicles | 80      | 110     | 120     | 70      | 40      |

Soln:-

| class   | class mark ( $x_i$ ) | Deviation ( $d_i$ )<br>$= x_i - A$ | NO. of vehicles<br>Frequency ( $f_i$ ) | Frequency x Deviation<br>( $f_i \times d_i$ ) |
|---------|----------------------|------------------------------------|--|---|
| 300-400 | 350                  | $350 - 550$<br>$= -200$            | 80                                     | -16000  |
| 400-500 | 450                  | $450 - 550$<br>$= -100$            | 110                                    | -11000  |
| 500-600 | 550<br>$= A$         | $550 - 550$<br>$= 0$               | 120                                    | 0   |
| 600-700 | 650                  | $650 - 550$<br>$= 100$             | 70                                     | 7000  |
| 700-800 | 750                  | $750 - 550$<br>$= 200$             | 40                                     | 8000  |
|         |                      |                                    | $\Sigma f_i = 420$                     | $\Sigma f_i d_i = -12000$                     |

$$\begin{aligned} \therefore \text{Mean} &= A + \frac{\sum f_i d_i}{\sum f_i} \\ &= 550 + \frac{-1200}{42} \\ &= 550 - 28.57 \end{aligned}$$

$$\text{Mean} = 521.43 \text{ rupees}$$

3. A milk centre sold milk to 50 customers. The table below gives the number of customers and the milk they purchased. Find the mean of the milk sold by direct method.

|                   |     |     |     |     |     |
|-------------------|-----|-----|-----|-----|-----|
| Milk Sold (Litre) | 1-2 | 2-3 | 3-4 | 4-5 | 5-6 |
| No. of Customers  | 17  | 13  | 10  | 7   | 3   |

Soln:-

| class | class mark ( $x_i$ ) | No. of Customers Frequency ( $f_i$ ) | Class mark $\times$ frequency ( $x_i \times f_i$ ) |
|-------|----------------------|--------------------------------------|--|
| 1-2   | 1.5                  | 17                                   | 25.5   |
| 2-3   | 2.5                  | 13                                   | 32.5   |
| 3-4   | 3.5                  | 10                                   | 35.0   |
| 4-5   | 4.5                  | 7                                    | 31.5   |
| 5-6   | 5.5                  | 3                                    | 16.5   |
|       |                      | $\sum f_i = 50$                      | $\sum f_i x_i = 141$                               |

$$\text{Now, Mean} = \frac{\sum f_i x_i}{\sum f_i}$$

$$= \frac{141}{50}$$

$$\text{Mean} = 2.82 \text{ Litres}$$

4. A frequency distribution table for the production of oranges of some farm owners is given below. Find the mean production of oranges by 'assumed mean' method.

|                                 |       |       |       |       |       |
|---------------------------------|-------|-------|-------|-------|-------|
| Production<br>(Thousand rupees) | 25-30 | 30-35 | 35-40 | 40-45 | 45-50 |
| No. of farm owners              | 20    | 25    | 15    | 10    | 10    |

Soln:-

| class | class mark<br>( $x_i$ ) | Deviation<br>( $d_i$ )<br>$= x_i - A$ | NO. of<br>farm owners<br>Frequency<br>( $f_i$ ) | Frequency x<br>Deviation<br>( $f_i \times d_i$ ) |
|-------|-------------------------|---------------------------------------|---|--|
| 25-30 | 27.5                    | $27.5 - 37.5$<br>$= -10$              | 20  | -200   |
| 30-35 | 32.5                    | $32.5 - 37.5$<br>$= -5$               | 25  | -125   |
| 35-40 | 37.5<br>$= A$           | $37.5 - 37.5$<br>$= 0$                | 15  | 0  |
| 40-45 | 42.5                    | $42.5 - 37.5$<br>$= 5$                | 10  | 50   |
| 45-50 | 47.5                    | $47.5 - 37.5$<br>$= 10$               | 10  | 100  |
|       |                         |                                       | $\sum f_i = 80$                                 | $\sum f_i d_i = -175$                            |

$$\begin{aligned}
\therefore \text{Mean} &= A + \frac{\sum f_i d_i}{\sum f_i} \\
&= 37.5 + \frac{-175}{80} \\
&= 37.5 - 2.1875 \\
&= 37.5 - 2.19 \\
&= 35.31 \times 1000
\end{aligned}$$

$$\text{Mean} = 35,310 \text{ rupees}$$

5. A frequency distribution of funds collected by 120 workers in a company for the drought affected people are given in the following table. Find the mean of the funds by 'step deviation' method.

|                |       |          |           |           |           |
|----------------|-------|----------|-----------|-----------|-----------|
| Fund (Rupees)  | 0-500 | 500-1000 | 1000-1500 | 1500-2000 | 2000-2500 |
| No. of workers | 35    | 28       | 32        | 15        | 10        |

Soln:-

$$\text{Mean} = A + h \times \frac{\sum f_i u_i}{\sum f_i}$$

$$= 1250 + 500 \times \frac{-63}{120}$$

$$= 1250 - 262.5$$

$$\text{Mean} = 987.5 \text{ rupees}$$

| class     | class mark ( $x_i$ ) | Deviation ( $d_i$ )<br>$= x_i - A$ | $u_i = \frac{d_i}{h}$<br>$(h = 500)$ | No. of Workers<br>Frequency ( $f_i$ ) | $f_i \times u_i$       |
|-----------|----------------------|------------------------------------|--------------------------------------|---------------------------------------|------------------------|
| 0-500     | 250                  | $250 - 1250$<br>$= -1000$          | $\frac{-1000}{500}$<br>$= -2$        | 35                                    | -70                    |
| 500-1000  | 750                  | $750 - 1250$<br>$= -500$           | $\frac{-500}{500}$<br>$= -1$         | 28                                    | -28                    |
| 1000-1500 | 1250<br>$= A$        | $1250 - 1250$<br>$= 0$             | $\frac{0}{500} = 0$                  | 32                                    | 0                      |
| 1500-2000 | 1750                 | $1750 - 1250$<br>$= 500$           | $\frac{500}{500} = 1$                | 15                                    | 15                     |
| 2000-2500 | 2250                 | $2250 - 1250$<br>$= 1000$          | $\frac{1000}{500} = 2$               | 10                                    | 20                     |
|           |                      |                                    |                                      | $\Sigma f_i = 120$                    | $\Sigma f_i u_i = -63$ |

6. The following table gives the information of frequency distribution of weekly wages of 150 workers of a company. Find the mean of the weekly wages by 'step deviation' method.

| Weekly wages (Rupees) | 1000-2000 | 2000-3000 | 3000-4000 | 4000-5000 |
|-----------------------|-----------|-----------|-----------|-----------|
| No. of workers.       | 25        | 45        | 50        | 30        |

Soln:-

$$\text{Mean} = A + h \times \frac{\Sigma f_i u_i}{\Sigma f_i}$$

$$= 2500 + 1000 \times \frac{85}{150}$$

$$= 2500 + 1000 \times 5.666$$

$$= 2500 + 1000 \times 5.7$$

$$= 2500 + 570$$

Mean = 3070 rupees

| class          | class mark ( $x_i$ ) | Deviation ( $d_i$ )<br>$= x_i - A$ | $u_i = \frac{d_i}{h}$<br>( $h = 1000$ ) | NO. of Workers<br>Frequency ( $f_i$ ) | $f_i \times u_i$      |
|----------------|----------------------|------------------------------------|---|---------------------------------------|-----------------------|
| 1000<br>- 2000 | 1500                 | 1500<br>- 2500<br>$= -1000$        | $\frac{-1000}{1000}$<br>$= -1$          | 25                                    | -25                   |
| 2000<br>- 3000 | 2500<br>$= A$        | 2500 -<br>2500 = 0                 | $\frac{0}{1000}$<br>$= 0$               | 45                                    | 0                     |
| 3000<br>- 4000 | 3500                 | 3500 -<br>2500<br>$= 1000$         | $\frac{1000}{1000} = 1$                 | 50                                    | 50                    |
| 4000<br>- 5000 | 4500                 | 4500 -<br>2500<br>$= 2000$         | $\frac{2000}{1000} = 2$                 | 30                                    | 60                    |
|                |                      |                                    |   | $\Sigma f_i = 150$                    | $\Sigma f_i u_i = 85$ |