



Statistics Ex 7.3 Q17

Answer :

We may prepare the table as shown:

Marks:	Mid value (x_i):	No. of students: (f_i)	$d_i = x_i - A$ $= x_i - 25$	$u_i = \frac{1}{h}(d_i)$ $= \frac{1}{10}(d_i)$	$f_i u_i$	$f_i d_i$	$f_i x_i$
0-10	5	20	-20	-2	-40	-400	100
10-20	15	24	-10	-1	-24	-240	360
20-30	25	40	0	0	0	0	1000
30-40	35	36	10	1	36	360	1260
40-50	45	20	20	2	40	400	900
		$\sum f_i = 140$			$\sum f_i u_i = 12$	$\sum f_i d_i = 120$	$\sum f_i x_i = 3620$

(i) **Direct method**

We know that mean, $\bar{X} = \frac{\sum f_i x_i}{\sum f_i}$

$$= \frac{3620}{140}$$

$$= 25.857$$

Hence, the mean is 25.857.

(ii) **Short-cut method**

Let the assumed mean $A = 25$.

$$\begin{aligned}
 \text{We know that mean, } \bar{X} &= A + \left(\frac{1}{N} \sum f_i d_i \right) \\
 &= 25 + \left(\frac{1}{140} \times (120) \right) \\
 &= 25 + \frac{120}{140} \\
 &= 25 + 0.857 \\
 &= 25.857
 \end{aligned}$$

Hence, the mean is 25.857.

(iii) Step deviation method

Let the assumed mean $A = 25$ and $h = 10$.

$$\begin{aligned}
 \text{We know that mean, } \bar{X} &= A + h \left(\frac{1}{N} \sum f_i u_i \right) \\
 &= 25 + 10 \left(\frac{1}{140} \times (12) \right) \\
 &= 25 + \frac{120}{140} \\
 &= 25 + 0.857 \\
 &= 25.857
 \end{aligned}$$

Hence, the mean is 25.857.

Statistics Ex 7.3 Q18

Answer :

It is given that mean = 62.8 and $N = 50$.

Let the assumed mean $A = 50$ and $h = 20$.

Class	Midvalue (x_i):	frequency (f_i):	$d_i = x_i - A$ $= x_i - 50$	$u_i = \frac{1}{h}(d_i)$ $= \frac{1}{20}(d_i)$	$f_i u_i$
0-20	10	5	-40	-2	-10
20-40	30	f_1	-20	-1	$-f_1$
40-60	50	10	0	0	0
60-80	70	f_2	20	1	f_2
80-100	90	7	40	2	14
100-120	110	8	60	3	24
		$\sum f_i = 30 + f_1 + f_2$			$\sum f_i u_i = 28 - f_1 + f_2$

$$\sum f_i = 50$$

$$30 + f_1 + f_2 = 50$$

$$f_1 = 20 - f_2 \quad \dots (1)$$

We know that mean, $\bar{X} = A + h \left(\frac{1}{N} \sum f_i u_i \right)$

Now, we have $\sum f_i = 30 + f_1 + f_2$, $\sum f_i u_i = 28 - f_1 + f_2$, $h = 20$ and $A = 50$.

Putting the values in the above formula, we have

$$62.8 = 50 + 20 \left(\frac{1}{30 + f_1 + f_2} \times (28 - f_1 + f_2) \right)$$

$$62.8 - 50 = 20 \left(\frac{1}{30 + f_1 + f_2} \times (28 - f_1 + f_2) \right)$$

$$12.8(30 + f_1 + f_2) = 20(28 - f_1 + f_2)$$

$$32.8f_1 - 7.2f_2 = 176 \quad \dots\dots(2)$$

Putting the value of f_1 in (2), we get

$$32.8(20 - f_2) - 7.2f_2 = 176$$

$$32.8 \times 20 - 32.8f_2 - 7.2f_2 = 176$$

$$656 - 176 = 40f_2$$

$$f_2 = \frac{480}{40}$$

$$= 12$$

Putting the value of f_2 in (1), we get

$$f_1 = 20 - 12$$

$$= 8$$

Hence, the missing frequency $f_1 = 8$ and $f_2 = 12$.

***** END *****