

(iii) Continuous Series : Arithmetic mean.

If mid value : $x_1, x_2, x_3, \dots, x_n$.

and frequency (f) : $f_1, f_2, f_3, \dots, f_n$.

$$\therefore \bar{x} = \frac{f_1 x_1 + f_2 x_2 + f_3 x_3 + \dots + f_n x_n}{f_1 + f_2 + f_3 + \dots + f_n}$$

$$\therefore \bar{x} = \frac{\sum fx}{\sum f} \quad \text{or} \quad \frac{\sum fx}{N}$$

Where.

$$x \text{ (mid value)} = \frac{\text{Upper Limit} + \text{Lower Limit}}{2}$$

C.I. = Class Interval.

Ex - Calculate mean for the following frequency distribution -

Income	Number of (frequency) persons
0-10	6
10-20	14
20-30	20
30-40	7
40-50	3

Solution -

c.I	f	x	fx
0-10	6	5	30
10-20	14	15	210
20-30	20	25	500
30-40	7	35	245
40-50	3	45	135
$\Sigma f = 50$		$\Sigma fx = 1120$	

where,

$$\begin{aligned}
 x &= \frac{10+0}{2} = 5 \\
 &= \frac{20+10}{2} = 15 \\
 &= \frac{30+20}{2} = 25
 \end{aligned}$$

$$\therefore \bar{x} = \frac{\Sigma fx}{\Sigma f}$$

$$= \frac{1120}{50} = 22.4$$

} -

* Short-cut method.

$$\bar{x} = a + \frac{\Sigma fdx}{\Sigma f}$$

Exa Solution of the same above questions by short-cut method.

c-I	f	x	dx	fdx
0-10	6	5	$x-25 = -20$	-120
10-20	14	15	-10	-140
20-30	20	25	0	0
30-40	7	35	10	70
40-50	3	45	20	60
$\Sigma f = 50$		$\Sigma fdx = -130$		

$$\bar{x} = a + \frac{\sum fdm}{\sum f}$$

$$= 25 + \left(\frac{-130}{50} \right)$$

$$= 25 - 2.6$$

$$= 22.4 \quad \checkmark$$