

## Step-1

4764-3.3-31P AID: 900

RID: 797

We have to find the average  $\bar{x}_{10}$  of the numbers  $b_1, b_2, \dots, b_{10}$ , also we have to find the coefficient of  $\bar{x}_9$  such that  $\hat{x}_{10} = \frac{1}{10} b_{10} + \hat{x}_9 = \frac{1}{10} (b_1 + b_2 + \dots + b_{10})$

## Step-2

Let required value is  $t$ .

Now given equation is

$$\bar{x}_{10} = \frac{1}{10} b_{10} + t \bar{x}_9 = \frac{1}{10} (b_1 + b_2 + \dots + b_{10})$$

$$\Rightarrow \frac{1}{10} b_{10} + t \hat{x}_9 = \frac{1}{10} b_{10} + \frac{1}{10} (b_1 + b_2 + \dots + b_9)$$

$$\Rightarrow t \hat{x}_9 = \frac{1}{10} (b_1 + b_2 + \dots + b_9)$$

## Step-3

We know that for  $b_1, b_2,$

$$\bar{x}_w = \frac{w_1^2 b_1 + w_2^2 b_2}{w_1^2 + w_2^2}$$

Therefore

$$t \left( \frac{w_1^2 b_1 + w_2^2 b_2 + \dots + w_9^2 b_9}{w_1^2 + w_2^2 + \dots + w_9^2} \right) = \frac{1}{10} (b_1 + b_2 + \dots + b_9) \quad \text{--- (1)}$$

## Step-4

For  $w_1 = 1, w_2 = 1, \dots, w_9 = 1$

Equation (1) is changed to

$$t \left( \frac{b_1 + b_2 + \dots + b_9}{1 + 1 + \dots + 1 (9 \text{ times})} \right) = \frac{1}{10} (b_1 + b_2 + \dots + b_9)$$

$$\Rightarrow t(b_1 + b_2 + \dots + b_9) = \frac{9}{10}(b_1 + b_2 + \dots + b_9)$$

Hence  $\boxed{t = \frac{9}{10}}$

Therefore  $\hat{x}_{10} = \frac{1}{10}b_{10} + \frac{9}{10}\hat{x}_9 = \frac{1}{10}(b_1 + b_2 + \dots + b_{10})$