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Quiz differential equation

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①

$$x = A, y = B, z = C$$

Let  $x, y$  and  $z$  to the casting of Palm-stem, Egr-plum and panonum cells respectively.

According to the condition

$$\frac{1}{4}x + \frac{2}{4}y + \frac{1}{4}z = 40 \rightarrow (1)$$

$$\frac{2}{4}x + \frac{1}{4}y + \frac{1}{4}z = 50 \rightarrow (2) \text{ See } \text{Ratio} : 4$$

$$\frac{2}{4}x + \frac{2}{4}z = 60 \rightarrow (3)$$

xy "4" both sides on equation

①, ② and ③ we get

$$(1) \Rightarrow x + 2y + z = 160$$

$$(2) \Rightarrow 2x + y + z = 200$$

$$(3) \Rightarrow 2x + z = 120$$

Now we use these equations in matrix form.

$$\begin{bmatrix} 1 & 2 & 1 \\ 2 & 1 & 1 \\ 2 & 0 & 1 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 160 \\ 200 \\ 120 \end{bmatrix}$$

$$A = \begin{bmatrix} 1 & 2 & 1 \\ 2 & 1 & 1 \\ 1 & 0 & 1 \end{bmatrix}, \quad x = \begin{bmatrix} x \\ y \\ z \end{bmatrix}, \quad b = \begin{bmatrix} 160 \\ 200 \\ 160 \end{bmatrix}$$

Now  $Ax = x \cdot B$

Now using Cramer's rule

$$Ax = \begin{bmatrix} 160 & 2 & 1 \\ 200 & 1 & 1 \\ 160 & 0 & 1 \end{bmatrix} \text{ we just replace } b_1 \text{ in column of } A_1$$

$$|A_1| = 160 \begin{vmatrix} 1 & 1 \\ 0 & 1 \end{vmatrix} - 2 \begin{vmatrix} 200 & 1 \\ 1200 & 1 \end{vmatrix} + \begin{vmatrix} 200 & 1 \\ 1200 & 1 \end{vmatrix}$$

$$= 160(1-0) - 2(200-1200) + (200-1200)$$

$$= 160 = 2(80) - 120 = 160 - 180 - 120$$

$$|A_1 x| = -120$$

Now find  $|A_1|$

$$|A_1| = \begin{vmatrix} 1 & 2 & 1 \\ 2 & 1 & 1 \\ 1 & 0 & 1 \end{vmatrix} = 1(1-0) - 1(2-1) + 1(0-1)$$

$$= 1 - 2 - 1 = -2$$

Now (A)

$$\Rightarrow x = \frac{|A_1 x|}{|A_1|} = \frac{-120}{-2} = 60$$

$$x = 60$$

$$\text{Also } y = \frac{|A_1 y|}{|A_1|} = \text{D}$$

$$A_1 y \begin{vmatrix} 1 & 160 & 1 \\ 2 & 200 & 1 \\ 1 & 120 & 1 \end{vmatrix} \quad \text{just replace } B_1 \text{ in} \\ \text{2nd column of } A_1$$

$$|A_1 y| = 1(200 - 120) - 160(2 - 1) + 1(240 - 200) \\ = 80 - 160 + 40$$

$$|A_1 y| = -40$$

$$\textcircled{5} \quad y = \frac{|A_1 y|}{|A_1|} = \frac{-40}{-2} = 20$$

$$y = B = 20$$

again

$$z = \frac{|A_1 z|}{|A_1|} = 6$$

$$A_1 z \begin{vmatrix} 1 & 2 & 160 \\ 2 & 1 & 200 \\ 1 & 0 & 120 \end{vmatrix}$$

$$|A_1 z| = 1(120 - 0) - 2(240 - 200) - 160(2 - 1) \\ = 120 - 80 - 160 = -120$$

$$\textcircled{6} \quad z = \frac{|A_1 z|}{|A_1|} = \frac{-120}{-2} = 60$$

$$z = C = 60$$

Hence

$$(x, y, z) = (60, 20, 60)$$

OR

$$(A, B, C) = (60, 20, 60)$$

it means that

Pakistan: Blend cost/kg of

Cotton = 60

Egyptian Blend/kg of cotton

= 20

America Blend cost/kg of

Cotton = 60