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I.D = 7955

subject = Diffrential equation.

Quiz no # 01

Section = "B" civil

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①

Question

A yarn merchant yells brands A,B,C of yarn each of which is blend of Pakistani, Egyptian ~~A~~and American Cotton in the ratio 1:2:1, 2:1:1, 2:0:2 respectively. If one kilogram of A,B,C costs 40,50 and 60 respectively, find the costs of of a kilogram of a cotton of each country.

1:2:1, 2:1:1, 2:0:2

40

P	E
A	E

B_1

50

P	P
A	E

B_2

60

P	P
A	A

B_3

let x, y and z be the costs ~~k~~ of kg of pakistani, Egyptian and American cotton respectively. The according to the given conditions

$$\left.\begin{aligned} \frac{1}{4}x + \frac{2}{4}y + \frac{1}{4}z &= 40, \\ \frac{2}{4}x + \frac{1}{4}y + \frac{1}{4}z &= 50, \\ \frac{2}{4}x + \frac{2}{4}z &= 60 \end{aligned}\right\} \quad \ldots\ldots (S')$$

(3)

$$A = \begin{bmatrix} 1 & 2 & 1 \\ 2 & 1 & 1 \\ 1 & 0 & 1 \end{bmatrix}, \underline{X} = \begin{bmatrix} x \\ y \\ z \end{bmatrix}, \underline{b} \begin{bmatrix} 160 \\ 200 \\ 120 \end{bmatrix}$$

$|A| = -2$

$$A = \begin{vmatrix} 1 & 2 & 1 \\ 2 & 1 & 1 \\ 1 & 0 & 1 \end{vmatrix} = 1(1\times1 - 0\times1) - 2(2\times1 - 1\times1) + 2(2\times1 - 1\times1)$$

$|A_1| = -120,$

$$|A_1| = \begin{vmatrix} 160 & 2 & 1 \\ 200 & 1 & 1 \\ 120 & 0 & 1 \end{vmatrix} = 160(1\times1 - 0\times1) - 2(200\times1 - 120\times1) + 1(200\times1 - 120\times1)$$

$|A_2| = -40,$

$$|A_2| = \begin{vmatrix} 1 & 160 & 1 \\ 2 & 200 & 1 \\ 1 & 120 & 1 \end{vmatrix} = 1(200\times1 - 120\times1) - 160(2\times1 - 1\times1) + 1(2\times1 - 1\times200)$$

$|A_3| = -120,$

$$|A_3| = \begin{vmatrix} 1 & 2 & 160 \\ 2 & 1 & 200 \\ 1 & 0 & 120 \end{vmatrix} = 1(1\times120 - 120\times1) - 160(2\times1 - 1\times1) + 1(2\times1 - 1\times200)$$

(4)

$$A=\begin{bmatrix}1 & 2 & 1\\ 2 & 1 & 1\\ 1 & 0 & 1\end{bmatrix}, \quad \underline{x}=\begin{bmatrix}x\\ y\\ z\end{bmatrix}, \quad \underline{b}=\begin{bmatrix}160\\ 200\\ 120\end{bmatrix}$$

$|A| = -2$

$|A_1| = -120, |A_3| = -40, |A_3| = -120$

according to cramers rule.

$$\begin{cases} x = \dfrac{|A_1|}{|A|} = \dfrac{-120}{-2} = 60, \\ y = \dfrac{|A_2|}{A} = \dfrac{-40}{-2} = 20 \\ z = \dfrac{|A_3|}{|A|} = \dfrac{-120}{-2} = 60 \end{cases}$$

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

$\begin{bmatrix} x \\ y \\ z \end{bmatrix}$, $\underline{b} = \begin{bmatrix} 160 \\ 200 \\ 120 \end{bmatrix}$

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

$$A = \begin{matrix} 1 & 2 & 1 \\ 2 & 1 & 1 \end{matrix}$$

$$A_1 = \begin{bmatrix} 160 & 2 & 1 \\ 200 & 1 & 1 \\ 120 & 0 & 0 \end{bmatrix}$$

$$A_2 = \begin{bmatrix} 1 & 160 & 1 \\ 2 & 200 & 1 \\ 1 & 120 & 1 \end{bmatrix}$$

$$A_3 = \begin{bmatrix} 1 & 2 & 160 \\ 2 & 1 & 200 \\ 1 & 0 & 120 \end{bmatrix}$$

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

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

$$A\underline{x} = \underline{b}$$