

Name :- Hamza Khan Yousafzai

ID :- 7487

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Section :- B

Quiz :- 4

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Solution

Ratios

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

(Cost of A, B, C (Per kg is 40, 50, 60))

$$A = \begin{array}{|c|c|} \hline P & E \\ \hline A & E \\ \hline \end{array} = 40 \rightarrow 1:2:1$$

$$B = \begin{array}{|c|c|} \hline P & P \\ \hline A & E \\ \hline \end{array} = 50 \quad 2:1:1$$

$$C = \begin{array}{|c|c|} \hline P & P \\ \hline A & A \\ \hline \end{array} = 60 \quad 2:0:2$$

 $x, y, z =$  Price of cotton

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

$$\frac{2}{4}x + \frac{1}{4}y + \frac{1}{4}z = 50 \quad -A$$

$$\frac{2}{4}x + \frac{2}{4}z + \frac{0}{4}y = 60$$

(2)

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

Now writing the following in matrix form

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

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

$$Ax = B$$

$$A_1 \begin{bmatrix} 160 & 2 & 1 \\ 200 & 1 & 1 \\ 1200 & 0 & 1 \end{bmatrix}$$

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

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

$$|A| = \begin{bmatrix} 1 & 2 & 1 \\ 2 & 1 & 1 \\ 1 & 0 & 1 \end{bmatrix}$$

(3)

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

$$|A_1| = 160(1 \times 1 - 0 \times 1) - 2(200 \times 1 - 120 \times 1)$$

$$|A_1| = -120$$

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

$$|A_2| = 1(200 \times 1 - 120 \times 1) - 160(2 \times (-1 \times 1 + 1))$$

$$(2 \times 1 - 1 \times 200)$$

$$|A_2| = -40$$

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

$$|A_3| = 1(1 \times 120) + (0 \times 200) - 2(2 \times 120 - 1 \times 200) +$$

$$160(2 \times 12 \times 1)$$

$$|A_3| = -120$$

$$|A| = -2 \quad |A_1| = -120, \quad |A_2| = -40, \quad |A_3| = -120$$

(4)

# Cramer's Rule

$$x = \frac{|A_1|}{|A|}$$

$$x = \frac{-120}{-2}$$

$$x = 60$$

$$y = \frac{|A_2|}{|A|}$$

$$y = \frac{-40}{-2}$$

$$y = 20$$

$$z = \frac{|A_3|}{|A|}$$

$$z = \frac{-120}{-2}$$

$$z = 60$$

$$(x, y, z) = \boxed{60, 20, 60}$$