RAVI MATHS TUITION CENTER, GKM COLONY, CH-82. PH- 8056206308

12th BM matrix 5 marks test 4

12th Standard 2019 EM

Date : 09-Jun-19

Business Maths

Reg.No. :

Time : 00:30:00 Hrs

Total Marks : 25

5 x 5 = 25

1) Solve the equations 2x + 3y = 7, 3x + 5y = 9 by Cramer's rule.

2) The total cost of 11 pencils and 3 erasers is Rs 64 and the total cost of 8 pencils and 3 erasers is Rs 49. Find the cost of each pencil and each eraser by Cramer's rule.

3) Solve by Cramer's rule x+y+z=4,2x−y+3z=1,3x+2y−z = 1

4) The price of 3 Business Mathematics books, 2 Accountancy books and one Commerce book is Rs840. The price of 2 Business Mathematics books, one Accountancy book and one Commerce book is Rs 570. The price of one Business Mathematics book, one Accountancy book and 2 Commerce books is Rs 630. Find the cost of each book by using Cramer's rule.

5) An automobile company uses three types of Steel S_1, S_2 and S_3 for providing three different types of Cars C_1, C_2 and C_3. Steel requirement R (in tonnes) for each type of car and total available steel of all the three types are summarized in the following table.

Types of Steel	Types of Car			Total Steel available
	C_1	C_2	C_3	
S_1	3	2	1	28
S_2	1	1	2	13
S_3	2	2	2	14

Determine the number of Cars of each type which can be produced by Cramer's rule.

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5 x 5 = 25

1) The equations are

2x+3y=7

3x+5y=9

Here

$$\triangle = \begin{vmatrix} 2 & 3 \\ 3 & 5 \end{vmatrix} = 1$$

$\neq 0$

∴ we can apply Cramer's Rule

Now

$$\triangle_x = \begin{vmatrix} 7 & 3 \\ 9 & 5 \end{vmatrix} = 8 \quad \triangle_y = \begin{vmatrix} 2 & 7 \\ 3 & 9 \end{vmatrix} = -3$$

∴ By Cramer's rule

$x = \dfrac{\triangle_x}{\triangle} = \dfrac{8}{1} = 8 \quad y = \dfrac{\triangle_y}{\triangle} = \dfrac{-3}{1} = -3$

∴ Solution is x=8,y=−3

2) Let 'x' be the cost of a pencil

Let 'y' be the cost of an eraser

∴ By given data, we get the following equations

11x+3y=64

8x+3y=49

It has unique solution.

$\triangle = \begin{vmatrix} 11 & 3 \\ 8 & 3 \end{vmatrix} = 9 \ne 0,$

$\triangle_x \begin{vmatrix} 64 & 3 \\ 49 & 3 \end{vmatrix} = 45 \qquad \triangle_y \begin{vmatrix} 11 & 64 \\ 8 & 49 \end{vmatrix} = 27$

∴ By Cramer's rule

$x = \frac{\triangle x}{\triangle} = \frac{45}{9} = 5$

$y = \frac{\triangle y}{\triangle} = \frac{27}{9} = 3$

∴ The cost of a pencil is Rs 5 and the cost of an eraser is Rs 3.

3) Here

$\triangle = \begin{vmatrix} 1 & 1 & 1 \\ 2 & -1 & 3 \\ 3 & 2 & -1 \end{vmatrix} = 13 \ne 0$

∴ We can apply Cramer's Rule and the system is consistent and it has unique solution.

$\triangle_x = \begin{vmatrix} 1 & 1 & 1 \\ 2 & -1 & 3 \\ 3 & 2 & -1 \end{vmatrix} = -13 \quad \triangle_y = \begin{vmatrix} 1 & 4 & 1 \\ 2 & 1 & 3 \\ 3 & 1 & -1 \end{vmatrix} = 39 \quad \triangle_z = \begin{vmatrix} 1 & 1 & 4 \\ 2 & -1 & 1 \\ 3 & 2 & 1 \end{vmatrix} = 26$

∴ By Cramer's rule

$x = \frac{\triangle x}{\triangle} = \frac{-13}{13} = -1 \quad y = \frac{\triangle y}{\triangle} = \frac{39}{13} = 3 \quad z = \frac{\triangle z}{\triangle} = \frac{26}{13} = 2$

∴ The solution is (x,y,z) = (−1,3,2)

4) Let 'x' be the cost of a Business Mathematics book

Let 'y' be the cost of a Accountancy book.

Let 'z' be the cost of a Commerce book.

∴ 3x+2y+z=840

2x+y+z=570

x+y+2z=630

Here

$\triangle = \begin{vmatrix} 3 & 2 & 1 \\ 2 & 1 & 1 \\ 1 & 1 & 2 \end{vmatrix} = -2 \ne 0 \quad \triangle_x = \begin{vmatrix} 840 & 2 & 1 \\ 570 & 1 & 1 \\ 630 & 1 & 2 \end{vmatrix} = -240$

$\triangle_y = \begin{vmatrix} 3 & 840 & 1 \\ 2 & 570 & 1 \\ 1 & 630 & 2 \end{vmatrix} = -300 \quad \triangle_z = \begin{vmatrix} 3 & 2 & 840 \\ 2 & 1 & 570 \\ 1 & 1 & 630 \end{vmatrix} = -360$

∴ By Cramer's rule

$x = \frac{\triangle x}{\triangle} = \frac{-240}{-2} = 120 \quad y = \frac{\triangle y}{\triangle} = \frac{300}{-2} = 150 \quad z = \frac{\triangle z}{\triangle} = \frac{360}{-2} = 180$

∴ The cost of a Business Mathematics book is Rs 120,

the cost of a Accountancy book is Rs 150 and

the cost of a Commerce book is Rs 180.

5) Let 'x' be the number of cars of type C1

Let 'y' be the number of cars of type C2

Let 'z' be the number of cars of type C3

$3x+2y+4z=28$

$x+y2z=13$

$2x+2y+z=14$

Here

$$\triangle = \begin{vmatrix} 3 & 2 & 4 \\ 1 & 1 & 2 \\ 2 & 2 & 1 \end{vmatrix} = -3 \neq 0 \qquad \triangle_x = \begin{vmatrix} 28 & 2 & 4 \\ 13 & 1 & 2 \\ 14 & 2 & 1 \end{vmatrix} = -6$$

$$\triangle_y = \begin{vmatrix} 3 & 28 & 4 \\ 1 & 1 & 2 \\ 2 & 2 & 1 \end{vmatrix} = -9 \qquad \triangle_z = \begin{vmatrix} 3 & 2 & 28 \\ 1 & 1 & 13 \\ 2 & 2 & 14 \end{vmatrix} = -12$$

$\therefore$ By Cramer's rule

$$x = \frac{\triangle x}{\triangle} = \frac{-6}{-3} = 2 \quad y = \frac{\triangle y}{\triangle} = \frac{-9}{-3} = 3 \quad z = \frac{\triangle z}{\triangle} = \frac{-12}{-3} = 4$$

$\therefore$ The number of cars of each type which can be produced are 2, 3 and 4.