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Sec A

Quiz 1

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Q No.1.

$$x + 3y + 5z + 2t = 2$$

$$-y + 3z + 4t = 0$$

$$2x + y + 9z + 6t = -3$$

$$3x + 2y + 4z + 8t = -1$$

Solution:-

Using Gauss Jordan method.

$$x + 3y + 5z + 2t = 2$$

$$-y + 3z + 4t = 0$$

$$2x + y + 9z + 6t = -3$$

$$3x + 2y + 4z + 8t = -1$$

writing in matrix form
system

$$2t + x + 3y + 5z = 2$$

$$x - y + 3z = 0$$

$$6t + 2x + y + 9z = -3$$

$$8t + 3x + 2y + 4z = -1$$

2	1	3	5	2
0	1	-1	3	0
-6	2	1	9	-3
8	3	2	4	-1

$$\left[\begin{array}{cccc|c} 2 & 0 & 4 & 2 & 2 \\ 0 & 1 & -1 & 3 & 0 \\ 6 & 2 & 1 & 9 & -3 \\ 8 & 3 & 2 & 4 & -1 \end{array} \right] \begin{array}{l} \text{ring row 2} \\ \text{by -1 and} \\ \text{add to row} \\ 1 \end{array}$$

$$\left[\begin{array}{cccc|c} 2 & 0 & 4 & 2 & 2 \\ 0 & 1 & -1 & 3 & 0 \\ 6 & 0 & 3 & 3 & -3 \\ 8 & 3 & 2 & 4 & -1 \end{array} \right] \begin{array}{l} \text{multi row 2 by} \\ -2 \text{ and add} \\ \text{it row} \end{array}$$

$$\left[\begin{array}{cccc|c} 2 & 0 & 4 & 2 & 2 \\ 0 & 1 & -1 & 3 & 0 \\ 6 & 0 & 3 & 3 & -3 \\ 8 & 0 & 5 & -5 & 1 \end{array} \right] \begin{array}{l} \text{multi row 2 by 3} \\ \text{and add it} \\ \text{to row 4} \end{array}$$

$$\left[\begin{array}{cccc|c} 1 & 0 & 2 & 1 & 1 \\ 0 & 1 & -1 & 3 & 0 \\ 6 & 0 & 3 & 3 & -3 \\ 8 & 0 & 5 & -3 & -1 \end{array} \right] \begin{array}{l} \text{Divide the} \\ \text{row by 2} \end{array}$$

$$\left[\begin{array}{cccc|c} 1 & 0 & 2 & 1 & 1 \\ 0 & 1 & -1 & 3 & 0 \\ 2 & 0 & 1 & 1 & -1 \\ 8 & 0 & 5 & -5 & -1 \end{array} \right] \begin{array}{l} \text{Divide} \\ \text{the row} \\ 3 \text{ by 3} \end{array}$$

$$\left[\begin{array}{cccc|c} 1 & 0 & 2 & 1 & 1 \\ 0 & 1 & -1 & 3 & 0 \\ 0 & 0 & -3 & -1 & -3 \\ 8 & 0 & 5 & -5 & -1 \end{array} \right] \begin{array}{l} \text{Multi rows by} \\ \text{2 and add it to} \\ \text{row 3} \end{array}$$

$$\left[\begin{array}{cccc|c} 1 & 0 & 2 & 1 & 1 \\ 0 & 1 & -1 & 3 & 0 \\ 0 & 0 & -3 & -1 & -3 \\ 0 & 0 & -11 & -13 & -9 \end{array} \right] \begin{array}{l} \text{Multi row 1 by -8} \\ \text{and add it to} \\ \text{row 4} \end{array}$$

$$\left[\begin{array}{cccc|c} 1 & 0 & 2 & 1 & 1 \\ 0 & 1 & -1 & 3 & 0 \\ 0 & 0 & 3 & 1 & 3 \\ 0 & 0 & 11 & 13 & 9 \end{array} \right] \begin{array}{l} \text{Multi the row} \\ \text{3 by -1} \end{array}$$

$$\left[\begin{array}{cccc|c} 1 & 0 & 2 & 1 & 1 \\ 0 & 1 & -1 & 3 & 0 \\ 0 & 0 & 3 & 1 & 3 \\ 0 & 0 & 11 & 13 & 9 \end{array} \right] \begin{array}{l} \text{Multi the} \\ \text{row by -1} \end{array}$$

$$\left[\begin{array}{cccc|c} 1 & 0 & -1 & 0 & -2 \\ 0 & 1 & -1 & 3 & 0 \\ 0 & 0 & 3 & 1 & 3 \\ 0 & 0 & 11 & 13 & 9 \end{array} \right] \begin{array}{l} \text{Multi row 3 by -1} \\ \text{and it to row} \end{array}$$

$$\left[\begin{array}{cccc|c} 1 & 0 & -1 & 0 & -2 \\ 0 & 1 & -10 & 0 & -9 \\ 0 & 0 & 3 & 1 & 3 \\ 0 & 0 & -28 & 0 & -30 \end{array} \right] \begin{array}{l} \text{Multi row 3} \\ \text{by } -13 \text{ and add} \\ \text{it to row 4} \end{array}$$

$$\left[\begin{array}{cccc|c} 1 & 0 & -1 & 0 & -2 \\ 0 & 1 & -10 & 0 & -9 \\ 0 & 0 & 3 & 1 & 3 \\ 0 & 0 & 1 & 0 & 15/14 \end{array} \right] \begin{array}{l} \text{Divide row} \\ 4 \text{ by } -28 \end{array}$$

$$\left[\begin{array}{cccc|c} 1 & 0 & 0 & 0 & -13/14 \\ 0 & 1 & -10 & 0 & -9 \\ 0 & 0 & 3 & 1 & 3 \\ 0 & 0 & 1 & 0 & 15/14 \end{array} \right] \begin{array}{l} \text{Add row} \\ 4 \text{ to row 1} \end{array}$$

$$\left[\begin{array}{cccc|c} 1 & 0 & 0 & 0 & -13/14 \\ 0 & 1 & 0 & 0 & 12/7 \\ 0 & 0 & 3 & 1 & 3 \\ 0 & 0 & 1 & 0 & 15/14 \end{array} \right] \begin{array}{l} \text{Multi row 4 by } 10 \\ \text{and add it to} \\ \text{row 2.} \end{array}$$

$$\left[\begin{array}{cccc|c} 1 & 0 & 0 & 0 & -13/14 \\ 0 & 1 & 0 & 0 & 12/7 \\ 0 & 0 & 0 & 1 & -3 \\ 0 & 0 & 1 & 0 & 15/14 \end{array} \right] \begin{array}{l} \text{Multi row 4 by} \\ -3 \text{ and add} \\ \text{it to row} \end{array}$$

Convert the augmented matrix into a system of linear equations

$$t = -13/14$$

$$x = 12/7$$

$$z = 3/14$$

$$y = 15/14$$

This possible solution of system is the ordered 4 type

$$(t, x, y, z) = \left(-13/14, 12/7, 15/14, 3/14\right)$$

Check if the given order 4 type is a solution of system of equations

$$\left[\begin{array}{l} 12/7 + 3 \times 15/14 + 5 \times (-3/14) + 2 \times (-13/14) = 2 \\ -13/14 + 3 \times (-3/14) + 12/7 \\ 2 \times 12/7 + 15/14 + 9 \times (-3/14) + 6 \times (-13/14) = 3 \\ 3 \times (12/7) + 2 \times 15/14 + 4 \times (-3/14) + 8 \times (-13/14) = -1 \end{array} \right]$$

Simplify the equation

$$2 = 2$$

$$0 = 0$$

$$-3 = -3$$

$$-1 = -1$$

Since all the equalities are true so ordered 4 type is the solution of system

$$(k, x, y, z) = \left(-\frac{13}{14}, \frac{12}{7}, \frac{13}{14}, -\frac{3}{14}\right)$$

Ans

