Quiz No: 01

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Dept: BE (CE)

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

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

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

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

Sol:

Using Guass jor dan method

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

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

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

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

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(2) writting 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

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$$\left[\begin{array}{cccc|c} 2 & 0 & 4 & 2 & 2 \\ 0 & 1 & -1 & 3 & 0 \\ 6 & 2 & 1 & 9 & -3 \\ 8 & 3 & 2 & 4 & -1 \end{array}\right]$$

Using row 2 by -1 and add to row 1

$$\left[\begin{array}{cccc|c} 2 & 0 & 4 & 2 & 2 \\ 0 & 1 & -1 & 3 & 0 \\ 6 & 0 & 3 & 3 & -3 \\ 8 & 3 & 2 & 4 & -1 \end{array}\right]$$

Multi row 2 by -2 and add it row

$$\left[\begin{array}{cccc|c} 2 & 0 & 4 & 2 & 2 \\ 0 & 1 & -1 & 3 & 0 \\ 6 & 0 & 3 & 3 & -3 \\ 8 & 0 & 5 & -5 & -1 \end{array}\right]$$

Multi row 2 by -3 and add it to row 4

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$$\left[\begin{array}{cccc|c} 1 & 0 & 2 & 1 & 1 \\ 0 & 1 & -1 & 3 & 0 \\ 6 & 0 & 3 & 3 & -3 \\ 8 & 0 & 5 & -3 & -1 \end{array}\right]$$

Divide the row by 2

$$\left[\begin{array}{cccc|c} 1 & 0 & 2 & 1 & 1 \\ 0 & 1 & -1 & 3 & 0 \\ 2 & 0 & 1 & 1 & -1 \\ 8 & 0 & 5 & -5 & -1 \end{array}\right]$$

Divide the row 3 by 3

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$$= \begin{bmatrix} 1 & 0 & 2 & 1 \\ 0 & 1 & -1 & 3 \\ 0 & 0 & -3 & -1 \\ 8 & 0 & 5 & -5 \end{bmatrix} \begin{matrix} 1 \\ 0 \\ -3 \\ -1 \end{matrix}$$

multi rows by 2 and it to row 3

$$= \begin{bmatrix} 1 & 0 & 2 & 1 \\ 0 & 1 & -1 & 3 \\ 0 & 0 & -3 & -1 \\ 0 & 0 & -11 & -13 \end{bmatrix} \begin{matrix} 1 \\ 0 \\ -3 \\ -9 \end{matrix}$$

multi row 1 by -8 and add it to row 4

$$= \begin{bmatrix} 1 & 0 & 2 & 1 \\ 0 & 1 & -1 & 3 \\ 0 & 0 & 3 & 1 \\ 0 & 0 & 11 & 13 \end{bmatrix} \begin{matrix} 1 \\ 0 \\ 3 \\ 9 \end{matrix}$$

Multi the row 3 by -1

$$= \begin{bmatrix} 1 & 0 & 2 & 1 \\ 0 & 1 & -1 & 3 \\ 0 & 0 & 3 & 1 \\ 0 & 0 & 11 & 13 \end{bmatrix} \begin{matrix} 1 \\ 0 \\ 3 \\ 9 \end{matrix}$$

Multi the row by -1

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$$= \left[\begin{array}{cccc|c} 1 & 0 & -1 & 0 & -2 \\ 0 & 1 & -1 & 3 & 0 \\ 0 & 0 & 3 & 1 & 3 \\ 0 & 0 & 11 & 13 & 9 \end{array}\right]$$

Multi row 3 by -1 and it to row

$$= \left[\begin{array}{cccc|c} 1 & 0 & -1 & 0 & -2 \\ 0 & 1 & -10 & 0 & -9 \\ 0 & 0 & 3 & 1 & 3 \\ 0 & 0 & -28 & 0 & -30 \end{array}\right]$$

Multi row 3 by -13 and add it to row 4

$$= \left[\begin{array}{cccc|c} 1 & 0 & -1 & 0 & -2 \\ 0 & 1 & -10 & 0 & -9 \\ 0 & 0 & 3 & 1 & 3 \\ 0 & 0 & 1 & 0 & 15/14 \end{array}\right]$$

Divide row 4 by -28

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$$\begin{bmatrix} 1 & 0 & 0 & 0 & -13/14 \\ 0 & 1 & -10 & 0 & -9 \\ 0 & 0 & 3 & 1 & 3 \\ 0 & 0 & 1 & 0 & 15/14 \end{bmatrix}$$ Add row 4 to row 1

$$\begin{bmatrix} 1 & 0 & 0 & 0 & -13/14 \\ 0 & 1 & 0 & 0 & 12/7 \\ 0 & 0 & 3 & 1 & 3 \\ 0 & 0 & 1 & 0 & 15/14 \end{bmatrix}$$ Multi row 4 by 10 and add it to row 2

$$= \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 \\ 0 & 0 & 1 & 0 \end{bmatrix}$$ Multi row 4 by -3 and add it to row

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Convert the augmented matrix into a system of linear equation

$t = -13/14$

$x = 12/7$

$z = +3/14$

$y = 15/14$

This possible solution of system is the ordered-4 type

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

Check if the given order 4 tuple is a solution of system of equation

$$\begin{cases} 12/7 + 3x\ 15/14 + 5x(-3/14) + 2x(-13/14) = 2 \\ -13/14 + 3x(-3/14) + 12/7 \\ 2x\ 12/7 + 15/14 + 9x(-3/14) + 6x(-13/14) = -3 \\ 3x\ 12/7 + 2x\ 15/14 + 4x(-3/14) + 8x(-13/14) \end{cases}$$

Simplify the equation

$2 = 2$

$0 = 0$

$-3 = -3$

$-1 = -1$

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

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

Ans)