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Section : "B"

Semester : 8<sup>th</sup>

Quiz : 01

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## Quiz #1

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

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

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

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

## Solution:

using Gauss Jordan Method:

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

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

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

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

$\Rightarrow$  Write system in matrix form.

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

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

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

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

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(2)

$$\Rightarrow \left[ \begin{array}{cccc|c} 2 & 1 & 3 & 5 & 2 \\ 0 & 1 & -1 & 3 & 0 \\ 6 & 2 & 1 & 9 & -3 \\ 8 & 3 & 2 & 4 & -1 \end{array} \right]$$

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

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

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

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

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$$\Rightarrow \left[ \begin{array}{cccc|c} 1 & 0 & 2 & 1 & 1 \\ 0 & 1 & -1 & 3 & 0 \\ 2 & 0 & 1 & 1 & -1 \\ 0 & 0 & 5 & -5 & -1 \end{array} \right] \text{ Divide thr rows by 3}$$

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

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

$$\Rightarrow \left[ \begin{array}{cccc|c} 1 & 0 & 2 & 1 & 1 \\ 0 & 1 & -1 & 3 & 0 \\ 0 & 0 & 3 & 1 & 3 \\ 0 & 0 & 11 & 13 & 9 \end{array} \right] \text{ Multi thr row 4 by -1}$$

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

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$$\Rightarrow \left[ \begin{array}{cccc|c} 1 & 0 & -1 & 0 & -2 \\ 0 & 1 & -10 & 0 & -9 \\ 0 & 0 & 3 & 1 & 3 \\ 0 & 0 & 11 & 13 & 9 \end{array} \right] \begin{array}{l} \text{Multi row 3 by } -3 \text{ \& } \\ \text{add it to row 2} \end{array}$$

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

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

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

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

⇒ Convert the augmented matrix into a system of linear equations.

$$t = -13/14$$

$$x = 12/7$$

$$z = 3/14$$

$$y = 15/14$$

The possible solution of system is the ordered 4-tuple.

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

⇒ Check if the given ordered 4-tuple is a solution of system of equations.

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$$\Rightarrow \begin{cases} 12/7 + 3x^{15/14} + 5x(-3/14) + 2x(-13/14) = 2 \\ -15/14 + 3x(-3/14) + 12/7 = 6 \\ 2x^{12/7} + 15/14 + 9x(-3/14) + 6x(13/14) = -3 \\ 3x^{12/7} + 2x^{15/14} + 4x(-3/14) + 8x(-3/14) = -1 \end{cases}$$

$\Rightarrow$  Simplify the equations

$$2 = 2$$

$$0 = 0$$

$$-3 = -3$$

$$-1 = -1$$

$\Rightarrow$  Since all the equalities are true so ordered 4-tuple is solution of system.

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

Ans

end: