

NAME

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Section

"A"

Submitted to

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Quiz

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01

----- x ----- x ----- x -----

Q#1

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

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

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

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

Sol:

In matrix form System

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

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

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

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

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

$$\left[ \begin{array}{cccc|c} 2 & 0 & 4 & 2 & 2 \\ 0 & 1 & -1 & 3 & 0 \\ 6 & 2 & 1 & 9 & -3 \\ 8 & 3 & 2 & 4 & -1 \end{array} \right] \quad -R_2 + R_1$$

$$\left[ \begin{array}{cccc|c} 2 & 0 & 4 & 2 & 2 \\ 0 & 1 & -1 & 3 & 0 \\ 6 & 0 & 3 & 3 & -3 \\ 8 & 3 & 2 & 4 & -1 \end{array} \right] \quad 2R_2 + R_1$$

$$\left[ \begin{array}{cccc|c} 2 & 0 & 4 & 2 & 2 \\ 0 & 1 & -1 & 3 & 0 \\ 6 & 0 & 3 & 3 & -3 \\ 8 & 0 & 5 & -5 & -1 \end{array} \right] \quad -3R_2 + R_4$$

$$\left[ \begin{array}{cccc|c} 1 & 0 & 2 & 1 & 1 \\ 0 & 1 & -1 & 3 & 0 \\ 6 & 0 & 3 & 3 & -3 \\ 8 & 0 & 5 & -3 & -1 \end{array} \right] \begin{array}{l} \\ R_1 \\ \hline 2 \\ \end{array}$$

$$\left[ \begin{array}{cccc|c} 1 & 0 & 2 & 1 & 1 \\ 0 & 1 & -1 & 3 & 0 \\ 2 & 0 & 1 & 1 & -3 \\ 8 & 0 & 5 & -5 & -1 \end{array} \right] \begin{array}{l} \\ R_3 \\ \hline 3 \\ \end{array}$$

$$\left[ \begin{array}{cccc|c} 1 & 0 & 2 & 1 & 1 \\ 0 & 1 & -1 & 3 & 0 \\ 0 & 0 & -3 & -1 & -3 \\ 8 & 0 & 5 & -5 & -1 \end{array} \right] \begin{array}{l} \\ \\ -8R_1 + R_4 \\ \end{array}$$

$$\left[ \begin{array}{cccc|c} 1 & 0 & 2 & 1 & 1 \\ 0 & 1 & -1 & 3 & 0 \\ 0 & 0 & -3 & -1 & -3 \\ 0 & 0 & -11 & -13 & -9 \end{array} \right] \begin{array}{l} \\ \\ -R_3 \\ \end{array}$$

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

$$\left[ \begin{array}{cccc|c} 1 & 0 & -1 & 0 & -2 \\ 0 & 1 & -1 & 3 & 0 \\ 0 & 0 & 3 & 1 & 3 \\ 0 & 0 & 11 & 13 & 9 \end{array} \right] \begin{array}{l} \text{multiply row 3} \\ \text{by } -1 \text{ \& add} \\ \text{it to } R_2 \end{array}$$

$$\left[ \begin{array}{cccc|c} 1 & 0 & -1 & 0 & -2 \\ 0 & 1 & -10 & 0 & -9 \\ 0 & 0 & 3 & 1 & 3 \\ 0 & 0 & 28 & 0 & -30 \end{array} \right] \quad -13R_3 + R_4$$

$$\left[ \begin{array}{cccc|c} 1 & 0 & -1 & 0 & -2 \\ 0 & 1 & -10 & 0 & -9 \\ 0 & 0 & 3 & 1 & 3 \\ 0 & 0 & 10 & 0 & 15/4 \end{array} \right] \quad R_4 / -28$$

$$\left[ \begin{array}{cccc|c} 1 & 0 & 0 & 0 & -13/4 \\ 0 & 1 & -10 & 0 & -9 \\ 0 & 0 & 3 & 1 & 3 \\ 0 & 0 & 1 & 0 & 15/4 \end{array} \right] \quad R_4 + R_1$$

$$\left[ \begin{array}{cccc|c} 1 & 0 & 0 & 0 & -13/4 \\ 0 & 1 & 0 & 0 & 12/7 \\ 0 & 0 & 3 & 1 & 3 \\ 0 & 0 & 1 & 0 & 15/4 \end{array} \right] \quad 10R_4 + R_2$$

$$\left[ \begin{array}{cccc|c} 1 & 0 & 0 & 0 & \\ 0 & 1 & 0 & 0 & \\ 0 & 0 & 0 & 1 & -3 \\ 0 & 0 & 1 & 0 & \text{row} \end{array} \right] \quad \begin{array}{l} \times \text{ply row 4 by} \\ -3 \text{ \& add it to} \\ \text{row} \end{array}$$

Convert the augmented matrix into a system of linear equations

$$t = -13/4 \quad x = 12/7 \quad z = 3/4 \quad y = 15/4$$

The possible solution of system is the order -4 type

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

CHECK if given order 4 type is  
a solution of system of equation

$$12/7 + 3\left(\frac{15}{14}\right) + 5\left(-\frac{3}{14}\right) + 2\left(-\frac{13}{14}\right) = 2$$

$$-13/14 + 3\left(-\frac{3}{14}\right) + 12/7$$

$$2\left(\frac{12}{7}\right) + 15/14 + 9\left(-\frac{3}{14}\right) + 6\left(\frac{13}{14}\right) = -3$$

$$3\left(\frac{12}{7}\right) + 2\left(\frac{15}{14}\right) - 4\left(-\frac{3}{14}\right) + 8\left(-\frac{13}{14}\right) = -1$$

by simplifying

$$2 = 2$$

$$0 = 0$$

$$-3 = -3$$

$$-1 = -1$$

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

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

Ans.