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SECTION: "A"

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QUESTION #1:

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

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

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

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

in matrix form system:

$$2t + x + 3y + 5z = 2$$
$$x - y + 3z = 0$$
$$6t + 2x + y - 4z = -3$$
$$8t + 3x + 2y + 4z = -1$$

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

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

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

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

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

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

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

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

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

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

multiply row 3 by -1 and add it to R_2

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

$$\left[\begin{array}{cccc|c} 1 & 0 & -1 & 0 & -2 \\ 0 & 1 & -10 & 0 & -9 \\ 0 & 0 & 3 & 1 & 3 \\ 0 & 0 & 10 & 0 & 15/14 \end{array}\right] \quad \frac{R_4}{-28}$$

$$\left[\begin{array}{cccc|c} 1 & 0 & 0 & 0 & -13/14 \\ 0 & 1 & -10 & 0 & -9 \\ 0 & 0 & 3 & 1 & 3 \\ 0 & 0 & 1 & 0 & 15/14 \end{array}\right] \quad R_4 + R_1$$

$$\left[\begin{array}{cccc|c} 1 & 0 & 0 & 0 & -13/14 \\ 0 & 1 & 0 & 0 & 12/7 \\ 0 & 0 & 3 & 1 & 3 \\ 0 & 0 & 1 & 0 & 15/14 \end{array}\right] \quad 10R_4 + R_2$$

$$\begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & \blacksquare & \blacksquare 1 \\ 0 & 0 & \blacksquare 1 & \blacksquare 0 \end{bmatrix}$$

convert the augmented matrix into a system of linear equation.

$t = -13/14$

$x = 12/7$

$z = 3/14$

$y = 15/14$

The possible solution of system is the order -4 type.

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

check if given order 4 type is a solution of system of equation.

$12/7 + 3(15/14) + 5(-3/14) + 2(-13/14) = 2$

$-13/14 + 3(-3/14) + 12/7$

$2(12/7) + 15/14 + 9(-3/14) + 6(13/14) = -3$

$8(12/7) + 2(15/14) + 4(-3/14) + 8(-13/14) = -1$

by simplyfying.

$2 = 2$

$0 = 0$

$-3 = -3$

$-1 = -1$

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

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

Ans.