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$$\begin{aligned}
 1.2 \quad & x + y = -5 \\
 & -3x - 2y = 12
 \end{aligned}$$

$$\begin{aligned}
 \begin{bmatrix} 2 & 1 \\ -3 & -2 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} &= \begin{bmatrix} -5 \\ 12 \end{bmatrix} \\
 \begin{bmatrix} x \\ y \end{bmatrix} &= \begin{bmatrix} 2 & 1 \\ -3 & -2 \end{bmatrix}^{-1} \begin{bmatrix} -5 \\ 12 \end{bmatrix} \\
 \begin{bmatrix} x \\ y \end{bmatrix} &= \frac{1}{2 \cdot -2 - 1 \cdot -3} \begin{bmatrix} -2 & -1 \\ 3 & 2 \end{bmatrix} \begin{bmatrix} -5 \\ 12 \end{bmatrix} = \frac{1}{-1} \begin{bmatrix} -2 & -1 \\ 3 & 2 \end{bmatrix} \begin{bmatrix} -5 \\ 12 \end{bmatrix} \\
 \begin{bmatrix} 2 & 1 \\ -3 & -2 \end{bmatrix} \begin{bmatrix} -5 \\ 12 \end{bmatrix} &= \begin{bmatrix} -10 + 12 \\ 15 - 24 \end{bmatrix} = \begin{bmatrix} 2 \\ -9 \end{bmatrix} \\
 x &= 2 \\
 y &= -9
 \end{aligned}$$

$$\begin{aligned}
 2. \quad & x + y + 2z = 9 \\
 & 2x + 4y + 3z = 1 \\
 & 3x + 6y - 5z = 0
 \end{aligned}$$

$$A = \begin{bmatrix} 1 & 1 & 2 \\ 2 & 4 & 3 \\ 3 & 6 & -5 \end{bmatrix} \quad B = \begin{bmatrix} 9 \\ 1 \\ 0 \end{bmatrix}$$

$$A_1 = \begin{bmatrix} 9 & 1 & 2 \\ 1 & 4 & 3 \\ 0 & 6 & -5 \end{bmatrix} \quad A_2 = \begin{bmatrix} 1 & 9 & 2 \\ 2 & 1 & 3 \\ 3 & 0 & -5 \end{bmatrix} \quad A_3 = \begin{bmatrix} 1 & 1 & 9 \\ 2 & 4 & 1 \\ 3 & 6 & 0 \end{bmatrix}$$

$$\begin{aligned}
 \det(A) &= 1 \begin{bmatrix} 4 & 3 \\ 6 & 5 \end{bmatrix}^{-1} \begin{bmatrix} 2 & 3 \\ 3 & 5 \end{bmatrix}^2 \begin{bmatrix} 2 & 4 \\ 3 & 6 \end{bmatrix} \\
 &= 1(9 - 18) - 1(10 - 9) + 2(12 - 12) = -9 - 1 + 0 = -10
 \end{aligned}$$

$$\begin{aligned}
 \det(A_1) &= 9 \begin{bmatrix} 4 & 3 \\ 6 & -5 \end{bmatrix} - 1 \begin{bmatrix} 1 & 3 \\ 0 & -5 \end{bmatrix} + 2 \begin{bmatrix} 1 & 4 \\ 0 & 6 \end{bmatrix} \\
 &= 9(-20 - 18) - 1(-5 - 0) + 2(6 - 0) = -325
 \end{aligned}$$

$$\begin{aligned}
 \det(A_2) &= 1 \begin{bmatrix} 1 & 3 \\ 0 & -5 \end{bmatrix} - 9 \begin{bmatrix} 2 & 3 \\ 3 & -5 \end{bmatrix} + 2 \begin{bmatrix} 3 & 1 \\ 3 & 0 \end{bmatrix} \\
 &= 1(-5 - 0) - 9(-10 - 9) + 2(0 - 3) = 160
 \end{aligned}$$



$$\det(A_3) = 1 \begin{vmatrix} 4 & 1 \\ 6 & 0 \end{vmatrix} - 1 \begin{vmatrix} 2 & 1 \\ 3 & 0 \end{vmatrix} + 9 \begin{vmatrix} 2 & 4 \\ 3 & 0 \end{vmatrix} \\ = 1(0-6) - 1(0-3) + 9(0-12) = -111$$

$$x = \frac{\det(A_1)}{\det(A)} = \frac{-325}{-10} = 32,5$$

$$y = \frac{\det(A_2)}{\det(A)} = \frac{160}{-10} = -16$$

$$z = \frac{\det(A_3)}{\det(A)} = \frac{-111}{-10} = 11,1$$

$$\text{jadi } x = 32,5, y = -16, z = 11,1$$

$$3,5x_1 + 2x_2 + 10x_3 + 16x_4 = 16$$

$$3x_1 + x_2 + 2x_4 = 4$$

$$3x_1 + x_2 - 9x_3 - 19x_4 = -4$$

$$4x_1 + x_2 - 3x_4 = 5$$

$$\begin{bmatrix} 5 & 2 & 10 & 16 \\ 3 & 1 & 0 & -2 \\ 3 & 1 & -9 & -19 \\ 4 & 1 & 0 & -3 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \end{bmatrix} = \begin{bmatrix} 16 \\ 4 \\ -4 \\ 5 \end{bmatrix}$$

$$A = \begin{bmatrix} +c_{11} & -c_{12} & +c_{13} & -c_{14} \\ -c_{21} & +c_{22} & -c_{23} & +c_{24} \\ +c_{31} & -c_{32} & +c_{33} & -c_{34} \\ -c_{41} & +c_{42} & -c_{43} & +c_{44} \end{bmatrix}$$

$$+c_{11} = \begin{bmatrix} 1 & 0 & -2 \\ 1 & -9 & -10 \\ 1 & 0 & -3 \end{bmatrix} \begin{bmatrix} 1 & 0 \\ 3 & -9 \\ 4 & 0 \end{bmatrix} = 27 + 0 + 0 - 0 + 0 + 18 = 9$$

$$-c_{12} = \begin{bmatrix} 3 & 0 & -2 \\ 3 & -9 & -19 \\ 4 & 0 & -3 \end{bmatrix} \begin{bmatrix} 3 & 0 \\ 3 & -9 \\ 4 & 0 \end{bmatrix} = (81 + 0 + 0) - (0 + 0 + 12) = -9$$

$$+c_{13} = \begin{bmatrix} 3 & 1 & -2 \\ 3 & 1 & -19 \\ 4 & 1 & -3 \end{bmatrix} \begin{bmatrix} 3 & 1 \\ 3 & 1 \\ 4 & 1 \end{bmatrix} = (-9 - 76 - 6) - (-9 - 57 - 8) = 17$$

$$-c_{14} = \begin{bmatrix} 3 & 1 & 0 \\ 3 & 1 & -9 \\ 4 & 1 & 0 \end{bmatrix} \begin{bmatrix} 3 & 1 \\ 3 & 1 \\ 4 & 1 \end{bmatrix} = (0 + 36 + 0) - (0 - 27 + 0) = -9$$



$$-c_{21} = \begin{bmatrix} 2 & 10 & 16 \\ 1 & -9 & -19 \\ 4 & 0 & -3 \end{bmatrix} \begin{bmatrix} 2 & 10 \\ 1 & -9 \\ 1 & 0 \end{bmatrix} = (54 - 190 + 0) - (-30 + 0 - 144) = 38$$

$$+c_{22} = \begin{bmatrix} 5 & 10 & 16 \\ 3 & -9 & -19 \\ 4 & 0 & -3 \end{bmatrix} \begin{bmatrix} 5 & 10 \\ 3 & -9 \\ 4 & 0 \end{bmatrix} = (135 - 760 + 0) - (-90 + 0 - 576) = 41$$

$$-c_{23} = \begin{bmatrix} 5 & 2 & 16 \\ 3 & 1 & -19 \\ 4 & 1 & -3 \end{bmatrix} \begin{bmatrix} 5 & 2 \\ 3 & 1 \\ 4 & 1 \end{bmatrix} = (15 - 152 + 48) - (-18 - 95 + 64) = -70$$

$$+c_{24} = \begin{bmatrix} 5 & 2 & 10 \\ 3 & 1 & -9 \\ 4 & 1 & 0 \end{bmatrix} \begin{bmatrix} 5 & 2 \\ 3 & 1 \\ 4 & 1 \end{bmatrix} = (10 - 72 + 30) - (0 - 45 + 40) = -37$$

$$+c_{31} = \begin{bmatrix} 2 & 10 & 16 \\ 1 & 0 & -2 \\ 1 & 0 & -3 \end{bmatrix} \begin{bmatrix} 2 & 10 \\ 1 & 0 \\ 1 & 0 \end{bmatrix} = (0 - 20 + 0) - (-30 + 0 + 0) = -50$$

$$-c_{32} = \begin{bmatrix} 5 & 10 & 16 \\ 3 & 0 & -2 \\ 1 & 0 & -3 \end{bmatrix} \begin{bmatrix} 5 & 0 \\ 3 & 0 \\ 4 & 0 \end{bmatrix} = (0 - 80 + 0) - (0 + 0 + 0) = -80$$

$$+c_{33} = \begin{bmatrix} 5 & 2 & 16 \\ 3 & 1 & -2 \\ 4 & 1 & -3 \end{bmatrix} \begin{bmatrix} 5 & 1 \\ 3 & 1 \\ 4 & 1 \end{bmatrix} = (-15 - 16 + 48) - (-19 - 10 + 64) = -28$$

$$-c_{34} = \begin{bmatrix} 5 & 2 & 10 \\ 3 & 1 & 0 \\ 4 & 1 & 0 \end{bmatrix} \begin{bmatrix} 5 & 2 \\ 3 & 1 \\ 4 & 1 \end{bmatrix} = (0 + 0 + 30) - (0 + 0 + 4) = 26$$

$$+c_{41} = \begin{bmatrix} 2 & 10 & 16 \\ 1 & 0 & -2 \\ 1 & -9 & -19 \end{bmatrix} \begin{bmatrix} 2 & 10 \\ 1 & 0 \\ 1 & -9 \end{bmatrix} = (0 - 20 - 144) - (190 + 36 + 0) = -10$$

$$-c_{42} = \begin{bmatrix} 5 & 10 & 16 \\ 3 & 0 & -2 \\ 4 & 0 & -3 \end{bmatrix} \begin{bmatrix} 5 & 10 \\ 3 & 0 \\ 4 & 0 \end{bmatrix} = (0 - 80 + 0) - (0 + 0 - 90) = -170$$

$$+c_{43} = \begin{bmatrix} 5 & 2 & 16 \\ 3 & 1 & -2 \\ 3 & 1 & -19 \end{bmatrix} \begin{bmatrix} 5 & 2 \\ 3 & 1 \\ 3 & 1 \end{bmatrix} = (-95 - 12 + 48) - (-114 - 10 + 48) = 17$$



$$-c_{44} = \begin{bmatrix} 5 & 2 & 10 \\ 3 & 1 & 0 \\ 3 & 1 & -9 \end{bmatrix} \begin{bmatrix} 5 & 2 \\ 3 & 1 \\ 3 & 1 \end{bmatrix} = (-45 + 0 + 30) - (30 + 0 + 54) = 9$$

$$x = A' \cdot B = \begin{bmatrix} 9 & 38 & -50 & -10 \\ -9 & 41 & -80 & -170 \\ -17 & -70 & -28 & -17 \\ -9 & -37 & -26 & 9 \end{bmatrix} \begin{bmatrix} 16 \\ 4 \\ -4 \\ 5 \end{bmatrix}$$

$$\begin{bmatrix} 144 & +152 & +200 & +(-50) \\ (-144) & +164 & +320 & +(-850) \\ (-272) & +(-1120) & +112 & +(-85) \\ (-144) & +(-148) & +(-104) & +45 \end{bmatrix}$$

$$\begin{bmatrix} 446 \\ -510 \\ -3.373 \\ -351 \end{bmatrix} \begin{matrix} x_1 = 446 \\ x_2 = -510 \\ x_3 = -3.373 \\ x_4 = -351 \end{matrix}$$

