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(1) a) $\begin{cases} 2x - y = 2 \\ -x + 3y = -3 \end{cases}$

$D = \begin{vmatrix} 2 & -1 \\ -1 & +3 \end{vmatrix}$ $+6 - 1 = \boxed{-7}$

$+6$

$D_x = \begin{vmatrix} 2 & -1 \\ -3 & 3 \end{vmatrix}$ $6 - 3 = \boxed{3}$

$D_y = \begin{vmatrix} 2 & 2 \\ -1 & -3 \end{vmatrix}$ $-6 - (-2) = \boxed{-4}$

-6

$D_1 = \dfrac{D_x}{D} \Rightarrow \dfrac{3}{-7}$

$D_2 = \dfrac{D_y}{D} \Rightarrow \dfrac{-4}{5}$

$V = \left\{ \left(\dfrac{3}{5}, \dfrac{-4}{5} \right) \right\}$

b) $\begin{cases} 3x - y + 2y = 1 \\ 2x + 0 + 3y = -1 \\ 4x + y - 2y = 7 \end{cases}$

$9 + 4 = 13$

$D = \begin{vmatrix} 3 & -1 & 1 \\ 2 & 0 & 3 \\ 4 & 1 & -2 \end{vmatrix} \begin{matrix} 3 & -1 \\ 2 & 0 \\ 4 & 1 \end{matrix}$

$-10 - 13 = \boxed{-23}$

$3 - 2 = 1$

$-12 + 2 = -10$

$D_x = \begin{vmatrix} 1 & -1 & 1 \\ 1 & -1 \end{vmatrix}$

$$O \quad 3 \quad -2 = 1$$

$$D_x = \begin{vmatrix} 1 & -1 & 1 \\ -1 & 0 & 3 \\ 7 & 1 & -2 \end{vmatrix} \begin{matrix} 1 & -1 \\ -1 & 0 \\ 7 & 1 \end{matrix}$$

$$-22 - 1 = -23 \qquad D_x = \frac{-23}{-23} = 1$$

$$O \quad -21 \quad -1 = -22$$

$$-4 \quad 63 \quad -4 = 55$$

$$① \, D_y = \begin{vmatrix} 3 & 1 & 1 \\ 2 & -1 & 3 \\ 4 & 7 & -2 \end{vmatrix} \begin{matrix} 3 & 1 \\ 2 & -1 \\ 4 & 7 \end{matrix} \qquad D_y = \frac{-23}{-23} = 1$$

$$32 - 55 = -23$$

$$6 \quad 12 \quad 14 = 32$$

$$3x - y + z = 1$$

$$3 \cdot 1 - 1 + z = 1 \rightarrow 3 - 1 + z = 1 \rightarrow z = 1 - 2 \rightarrow z = -1$$

$$-6 \quad -12 \quad 48 \quad = 31$$

(2) $D = \begin{vmatrix} 3 & 4 & -1 \\ 4 & 5 & 2 \\ 1 & -2 & 3 \end{vmatrix} \begin{matrix} 3 & 4 \\ 4 & 5 \\ 1 & -2 \end{matrix}$

$$61 - 31 = 30$$

$$45 \quad 8 \quad 8 = 61$$

$D_y = \begin{vmatrix} 3 & 1 & -1 \\ 4 & 12 & 2 \\ 1 & 8 & 3 \end{vmatrix} \begin{matrix} 3 & 1 \\ 4 & 12 \\ 1 & 8 \end{matrix}$ $\quad -12 \quad 48 \quad 32 = 48$

$$78 - 48 = 30$$

$$108 \quad 2 \quad -32 = 78$$

$$D_y = \frac{30}{30} = 1$$

$$-9 \quad -2 \quad -4 = -15$$

4) $D = \begin{vmatrix} 1 & 2 & -3 \\ 1 & 3 & 2 \\ 1 & -1 & -2 \end{vmatrix} \begin{matrix} 1 & 2 \\ 1 & 3 \\ 1 & -1 \end{matrix}$ $1 - (-15) = \boxed{16}$

$$-6 \quad 4 \quad 3 = 1$$

$$-72 \quad -58 \quad -16 = -146$$

$D_x = \begin{vmatrix} 29 & 2 & -3 \\ 4 & 3 & 2 \\ 8 & -1 & -2 \end{vmatrix} \begin{matrix} 29 & 2 \\ 4 & 3 \\ 8 & -1 \end{matrix}$ $-130 - (-146) = \boxed{16}$ $D_x = \dfrac{16}{16} = 1$

$$-174 \quad 32 \quad 12 = -130$$

$$-32 \quad 16 \quad -38 = -54$$

$D_y = \begin{vmatrix} 1 & 29 & -3 \\ 1 & 4 & 2 \\ 1 & 8 & -2 \end{vmatrix} \begin{matrix} 1 & 29 \\ 1 & 4 \\ 1 & 8 \end{matrix}$ $26 - (-54) = 80$ $D_y = \dfrac{80}{16} = 5$

$$-8 \quad 58 \quad -24 = 26$$

$$87 \quad -4 \quad 13 = 99$$

$D_z = \begin{vmatrix} 1 & 2 & 29 \\ 1 & 3 & 4 \\ 1 & -1 & 8 \end{vmatrix} \begin{matrix} 1 & 2 \\ 1 & 3 \\ 1 & -1 \end{matrix}$ $3 - 99 = -96$ $D_z = \dfrac{-96}{16} = -6$

$$24 \quad 8 \quad -29 = 3$$

$$R = 1 + 5 - 6 = \boxed{0}$$

$$0 \quad 4 \quad 0 = 4$$

5) $D = \begin{vmatrix} 2 & 1 & 0 \\ 0 & 2 & 1 \\ 3 & 2 & 1 \end{vmatrix} \begin{matrix} 2 & 1 \\ 0 & 2 \\ 3 & 2 \end{matrix}$ $7 - 4 = 3$
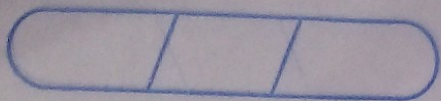
$$4 \quad 3 \quad 0 = 7$$

$$0 \quad 10 \quad 3 = 13$$

$D_x = \begin{vmatrix} 3 & 1 & 0 \\ 3 & 2 & 1 \\ 7 & 2 & 1 \end{vmatrix} \begin{matrix} 3 & 1 \\ 3 & 2 \\ 7 & 2 \end{matrix}$ $17 - 13 = 4$ $D_x = \dfrac{4}{3}$

$$10 \quad 7 \quad 0 = 17$$

O 14 0 = 14

① $D_y = \begin{vmatrix} 2 & 5 & 0 \\ 0 & 3 & 1 \\ 3 & 7 & 1 \end{vmatrix} \begin{matrix} 2 & 5 \\ 0 & 3 \\ 3 & 7 \end{matrix}$ 21 − 14 = 7 $D_y = \dfrac{7}{3}$

6 15 0 = 21

30 12 0 = 42

$D_z = \begin{vmatrix} 2 & 1 & 5 \\ 0 & 2 & 3 \\ 3 & 2 & 7 \end{vmatrix} \begin{matrix} 2 & 1 \\ 0 & 2 \\ 3 & 2 \end{matrix}$ 37 − 42 = −5 $D_z = \dfrac{-5}{3}$

28 9 0 = 37

−3 14 0 = 11

(6) $D = \begin{vmatrix} 1 & 2 & 0 \\ 2 & 1 & 0 \\ -1 & 2 & 2 \end{vmatrix}$ $D_y = \begin{vmatrix} 1 & 0 & 3 \\ 2 & 1 & 7 \\ -1 & 2 & -1 \end{vmatrix} \begin{matrix} 1 & 0 \\ 2 & 1 \\ -1 & 2 \end{matrix}$ 11 − 11 = $\boxed{0}$

$D = 2$

−1 0 12 = 11