

(1) (a)

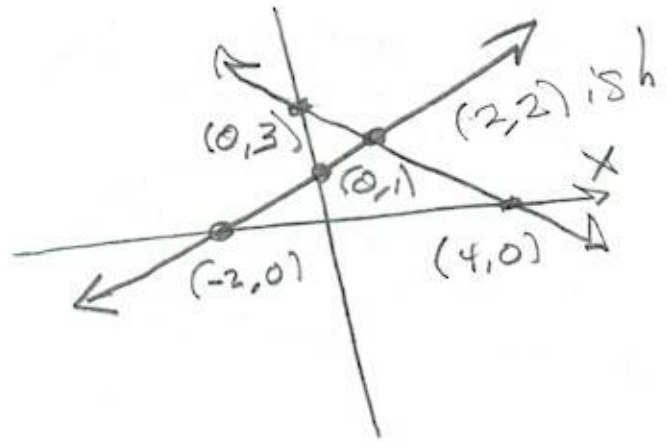
$$x - 2y = -2$$

x	y
0	-1
-2	0

$$x - 2y = -2$$

$$3x + 4y = 12$$

x	y
0	3
4	0



(b)

$$x - 2y = -2$$

$$x = 2y - 2 \rightarrow 3x + 4y = 3(2y - 2) + 4y = 12$$

$$\rightarrow 6y - 6 + 4y = 12$$

$$\rightarrow 10y = 18$$

$$y = \frac{18}{10} = \left(\frac{9}{5} \text{ OR } 1.8 = y\right)$$

$$\rightarrow x = 2y - 2 = 2\left(\frac{9}{5}\right) - 2 = \frac{18}{5} - \frac{10}{5} = \frac{8}{5}$$

$$= x = \frac{8}{5} = 1.6$$

$$(x, y) = \left(\frac{8}{5}, \frac{9}{5}\right)$$

(c) $-3E1 + E2$

$$-3(x - 2y = -2)$$

$$x - 2y = x - 2\left(\frac{9}{5}\right)$$

$$= x - \frac{18}{5} = -2 = -\frac{10}{5}$$

$$x = \frac{8}{5}$$

$$-3x + 6y = 6$$

$$3x + 4y = 12$$

$$-3E1 + E2 \rightarrow 10y = 18$$

$$y = \frac{18}{10} = \frac{9}{5}$$

12.1

WP #4

Boy, I squeezed that #2 too tight!
 What was I thinking?

(2)

$$\begin{aligned} x + 2y &= -1 \\ 3x + 7y - z &= -6 \\ -2x - 6y + 3z &= 9 \end{aligned}$$

Matrix Method:

$$\left[\begin{array}{ccc|c} 1 & 2 & 0 & -1 \\ 3 & 7 & -1 & -6 \\ -2 & -6 & 3 & 9 \end{array} \right] \sim$$

$$\left[\begin{array}{ccc|c} 1 & 2 & 0 & -1 \\ 0 & 1 & -1 & -3 \\ 0 & -10 & 3 & 7 \end{array} \right] \sim$$

$$\left[\begin{array}{ccc|c} 1 & 0 & -1 & -1 \\ 0 & 1 & -1 & -3 \\ 0 & 0 & 1 & 1 \end{array} \right]$$

Then back substitute.

$$\left[\begin{array}{ccc|c} 1 & 2 & 0 & -1 \\ 3 & 7 & -1 & -6 \\ -2 & -6 & 3 & 9 \end{array} \right] \begin{array}{l} R1 \\ -3R1 + R2 \\ 2R1 + R3 \end{array} \left[\begin{array}{ccc|c} 1 & 2 & 0 & -1 \\ 0 & 1 & -1 & -3 \\ 0 & -2 & 3 & 7 \end{array} \right]$$

$$\begin{array}{l} R1 \\ R2 \\ 2R2 + R3 \end{array} \left[\begin{array}{ccc|c} 1 & 2 & 0 & -1 \\ 0 & 1 & -1 & -3 \\ 0 & 0 & 1 & 1 \end{array} \right]$$

$$\begin{aligned} x + 2y &= -1 \\ y - z &= -3 \\ \hline z &= 1 \end{aligned}$$

Backtrack:

$$\Rightarrow y - z = y - 1 = -3$$

$$\Rightarrow \boxed{y = -2}$$

$$\Rightarrow x + 2y = x + 2(-2) = -1$$

$$\Rightarrow x - 4 = -1 \Rightarrow \boxed{x = 3}$$

$$\boxed{(x, y, z) = (3, -2, 1)}$$

#3 re-done, with x's, y's & z's.

$$\begin{array}{r} 2 \\ \cancel{3} \end{array} \begin{array}{l} (x + 2y = -1) \\ 3x + 7y - z = -6 \\ -2x - 6y + 3z = 9 \end{array} \begin{array}{l} -3E1 \\ E2 \\ -3E1 + E2 \end{array} \begin{array}{l} -3x - 6y = 3 \\ 3x + 7y - z = -6 \\ \hline y - z = -3 \end{array} = 3$$

$$\begin{array}{r} 2E1 \\ E3 \end{array} \begin{array}{l} 2x + 4y = -2 \\ -2x - 6y + 3z = 9 \end{array} \begin{array}{l} \\ \\ \hline 2E1 + E3 \end{array} \begin{array}{l} \\ \\ -2y + 3z = 7 \end{array}$$

2nd System: $\begin{array}{l} x + 2y = -1 \\ y - z = -3 \end{array}$

$$2 \begin{array}{l} y - z = -3 \\ -2y + 3z = 7 \end{array}$$

$$\begin{array}{r} 2E2 \\ E3 \end{array} \begin{array}{l} 2y - 2z = -6 \\ -2y + 3z = 7 \end{array} \begin{array}{l} \\ \\ \hline 2E2 + E3 \end{array} \begin{array}{l} \\ \\ z = 1 \end{array}$$

⇒ 3rd System: $\begin{array}{l} E1 \\ E2 \\ E3 \end{array} \begin{array}{l} x + 2y = -1 \\ y - z = -3 \\ z = 1 \end{array}$

$$E3 \Rightarrow E2 \text{ is } y - (1) = -3$$

$$\boxed{y = -2}$$

Finally

$$E1 \text{ is } x + 2(-2) = -1$$

$$x - 4 = -1 \Rightarrow \boxed{x = 3}$$

$$\boxed{(x, y, z) = (3, -2, 1)}$$

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WP#4

(4)

I'm still cramping my work's Daught.

$$\textcircled{3} \begin{matrix} -2 \\ -3 \end{matrix} (x+3y-2z=3)$$

$$\textcircled{a} \begin{matrix} 3x+7y-7z=11 \\ 2x+4y-5z=8 \end{matrix}$$

$$-3E1 \quad -3x-9y+6z=-9$$

$$E2 \quad 3x+7y-7z=11$$

$$-3E1+E2$$

$$-2y-z=2$$

$$-2E1-2x-6y+4z=-6$$

$$E3 \quad 2x+4y-5z=8$$

$$-2y-z=2$$

$$x+3y-2z=3 \quad E1$$

$$-2y-z=2 \quad -E2$$

$$-2y-z=2 \quad -E2+E3$$

$$\Rightarrow 2y = -z-2$$

$$\Rightarrow y = \frac{-z-2}{2}$$

$$x+3y-2z=3$$

$$2y+z=-2$$

$$0=0$$

$$x+3y-2z=3$$

$$x+3\left(\frac{-z-2}{2}\right)-2z=3$$

$$x = \frac{3z+6}{2} - 2z\left(\frac{2}{2}\right) = x - \frac{3z}{2} - 3 - \frac{2z}{2} = 3$$

$$x - \frac{5z}{2} = 6$$

$$x = \frac{5z}{2} + 6 \quad \text{OR} \quad \frac{5z+12}{2} = x$$

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(3b) $z=0 : (x, y, z) = (6, -1, 0)$

$z=1 : (x, y, z) = \left(\frac{5(1)+12}{2}, \frac{-1-2}{2}, 1 \right)$

$= \left(\frac{17}{2}, -\frac{3}{2}, 1 \right) = (x, y, z)$

$z=-1 : (x, y, z) = \left(\frac{5(-1)+12}{2}, \frac{-(-1)-2}{2}, -1 \right)$

$= \left(\frac{7}{2}, -\frac{1}{2}, -1 \right) = (x, y, z)$

(3c) We re-work ~~3a~~ 3a, with one change, using matrices:

$x+3y-2z=3$
 $3x+7y-7z=11$
 $2x+4y-5z=9$

$$\left[\begin{array}{ccc|c} 1 & 3 & -2 & 3 \\ 3 & 7 & -7 & 11 \\ 2 & 4 & -5 & 9 \end{array} \right]$$

The change

R_1
 $-3R_1+R_2$
 $-2R_1+R_3$

$$\left[\begin{array}{ccc|c} 1 & 3 & -2 & 3 \\ 0 & -2 & -1 & 2 \\ 0 & -2 & -1 & 3 \end{array} \right]$$

R_1
 R_2
 $-R_2+R_3$

$$\left[\begin{array}{ccc|c} 1 & 3 & -2 & 3 \\ 0 & -2 & -1 & 2 \\ 0 & 0 & 0 & 1 \end{array} \right]$$

$0=1?$
 Absurd!
 No Solution!