

Writing Project #4

1 a 10pts

$$2x + 2y = -14$$

$$3x - y = -5$$

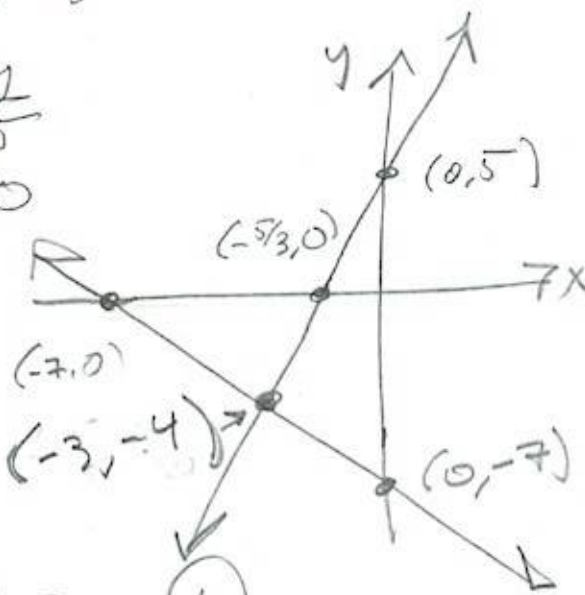
$$2x + 2y = -14$$

$$x + y = -7$$

x	y
0	-7
-7	0

$$3x - y = -5$$

x	y
0	5
$-\frac{5}{3}$	0



b $3x - y = -5$

$$-y = -3x - 5$$

$$y = 3x + 5 \rightarrow$$

$$2x + 2y = 2x + 2(3x + 5) = -14$$

$$\rightarrow 2x + 6x + 10 = 8x + 10 = -14$$

$$\rightarrow 8x = -24$$

$$\rightarrow x = \frac{-24}{8} = -3 = x$$

$$\rightarrow y = 3(-3) + 5 = -4$$

$$-4 = y$$

From (b)
Looks about right.

LC 10 pts

$$E1 \quad 2x + 2y = -14 \quad E1$$

$$E2 \quad 3x - y = -5 \quad E2$$

$$\frac{1}{2}E1: \quad 1x + 1y = -7 \quad E1$$

$$-3E1 \quad -3x - 3y = 21$$

$$E2 \quad 3x - y = -5$$

$$-4y = +16$$

$$y = -4$$

$$x + y = x - 4 = -7 \rightarrow$$

$$x = -3$$

$$(x, y) = (-3, -4) \text{ OR}$$

$$(x, y) \in \{(-3, -4)\}$$

2 (10 pts)

$$x + 2y - 2z = -16$$

$$x + 2y - 3z = -28$$

$$2x + 3y - z = -1$$

$$-E1 \quad -x - 2y + 2z = 16$$

$$E2 \quad x + 2y - 3z = -28$$

$$-2E1 \quad -2x - 4y + 4z = 32$$

$$E3 \quad 2x + 3y - z = -1$$

$$-E1 + E2$$

$$-z = -12$$

$$z = 12$$

$$-2E1 + E3$$

$$-y + 3z = 31$$

NEW System: $x + 2y - 2z = -16$

$$z = 12$$

$$-y + 3z = 31$$

Re-write

$$x + 2y - 2z = -16$$

$$y - 3z = -31$$

$$z = 12$$

$$y - 3z = y - 3(12) = y - 36 = -31$$

$$y = 5$$

$$x + 2y - 2z = -16$$

$$= x + 2(5) - 2(12) = x + 10 - 24 = x - 14 = -16$$

$$x = -2$$

Check

$$\begin{bmatrix} 1 & 2 & -2 \\ 1 & 2 & -3 \\ 2 & 3 & -1 \end{bmatrix} \begin{bmatrix} -2 \\ 5 \\ 12 \end{bmatrix} = \begin{bmatrix} -2 + 10 - 24 \\ -2 + 10 - 36 \\ -4 + 15 - 12 \end{bmatrix} = \begin{bmatrix} 10 - 26 \\ 10 - 38 \\ 15 - 16 \end{bmatrix} = \begin{bmatrix} -16 \\ -28 \\ -1 \end{bmatrix}$$

121

WP4

(3)

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

$$2x + 7y - 5z = 6 \quad E2$$

$$7x + 22y - 16z = 20 \quad E3$$

$$-2E1 \quad -2x - 2y + 2z = -4$$

$$-7E1 \quad -7x - 7y + 7z = -14$$

$$E2 \quad 2x + 7y - 5z = 6$$

$$E3 \quad 7x + 22y - 16z = 20$$

$$-2E1 + E2$$

$$5y - 3z = 2$$

$$-7E1 + E3$$

$$15y - 9z = 6$$

NEW System ;

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

$$E2 \quad 5y - 3z = 2$$

$$E3 \quad 15y - 9z = 6$$

$$-3E2 \quad -15y + 9z = -6$$

$$E3 \quad 15y - 9z = 6$$

$$0 = 0$$

NEW SYSTEM

$$x + y - z = 2$$

$$5y - 3z = 2$$

So $5y = 3z + 2$

$$\Rightarrow y = \frac{3z + 2}{5}$$

$$x + y - z = 2$$

$$x + \frac{3z + 2}{5} - z = 2$$

$$x + \frac{3z + 2 - 5z}{5} = 2$$

2 10pts

#3 cont'd

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

$$\Rightarrow x = 2 + \frac{2z}{5} - \frac{2}{5} = \frac{10}{5} + \frac{2z}{5} - \frac{2}{5}$$

$$\boxed{\frac{2z+8}{5} = x}$$

(a)

$$(x, y, z) \in \left\{ \left(\frac{2z+8}{5}, \frac{3z+2}{5}, z \right) \mid z \in \mathbb{R} \right\}$$

$$z=0 \Rightarrow (x, y, z) = \left(\frac{8}{5}, \frac{2}{5}, 0 \right)$$

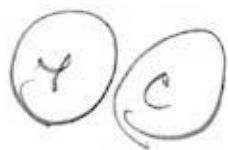
$$z=1 \Rightarrow (x, y, z) = \left(\frac{10}{5}, \frac{5}{5}, 1 \right) = (2, 1, 1)$$

$$z=-1 \Rightarrow (x, y, z) = \left(\frac{6}{5}, -\frac{1}{5}, -1 \right)$$

(b) 10pts

121

wp 4



$$x + y - z = 2$$

$$2x + 7y - 5z = 6$$

$$7x + 22y - 16z = 27$$

$$\left[\begin{array}{ccc|c} 1 & 1 & -1 & 2 \\ 2 & 7 & -5 & 6 \\ 7 & 22 & -16 & 27 \end{array} \right] \begin{array}{l} R1 \\ -2R1 + R2 \\ -7R1 + R3 \end{array} \quad \left[\begin{array}{ccc|c} 1 & 1 & -1 & 2 \\ 0 & 5 & -3 & 2 \\ 0 & 15 & -9 & 13 \end{array} \right]$$

$$\begin{array}{l} R1 \\ R2 \\ -3R2 + R3 \end{array} \left[\begin{array}{ccc|c} 1 & 1 & -1 & 2 \\ 0 & 5 & -3 & 2 \\ 0 & 0 & 0 & 7 \end{array} \right] \begin{array}{l} x + y - z = 2 \\ 5y - 3z = 2 \\ 0 = 7? \end{array}$$

Absurd! Therefore, there was
no solution to begin with.
(Reasoning as if a solution existed
led us unerringly to an absurdity!)