121 WRITING PROJECT #4 FALL, 2018

(1)(a) I gave you a puzzler, here, because to get the picture right, you need to look at the slopes.

$x-3y=-9$

x	y
0	3
-9	0

(0,3)

(-9,0)

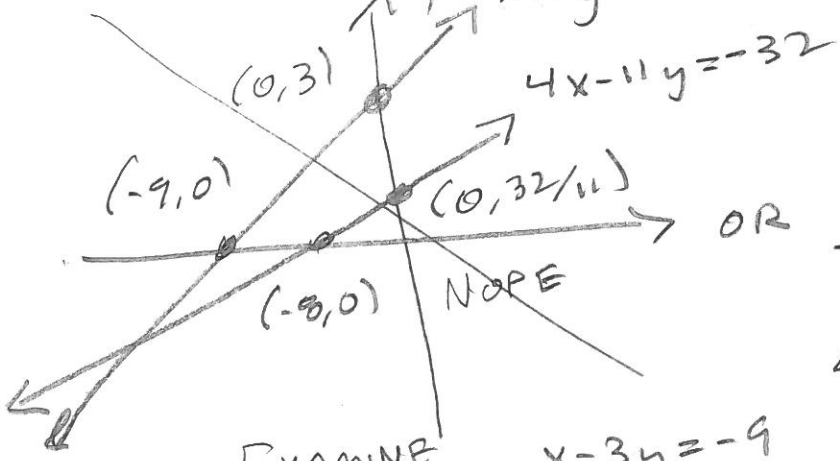
$4x-11y=-32$

x	y
0	$\frac{32}{11}$
-8	0

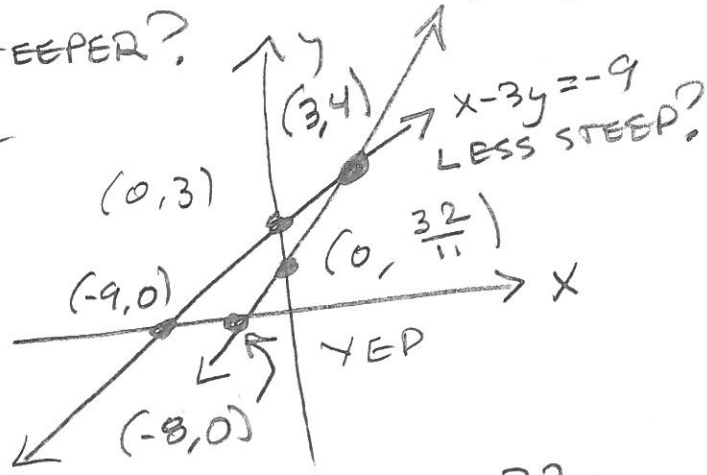
$(0, \frac{32}{11})$

(-8,0)

It's not immediately obvious which of these two pictures is correct:



OR



STEEPER?

EXAMINE SLOPE:

$x-3y=-9$

$-3y=-x-9$

$y=\frac{1}{3}x+3$

$m=\frac{1}{3}$

$4x-11y=-32$

$-11y=-4x-32$

$y=\frac{4}{11}x+\frac{32}{11}$

$m=\frac{4}{11}$

SOLN IS (3,4) in QI (After parts b & c)

Which is smaller?

$\frac{1}{3}\cdot\frac{11}{11}=\frac{11}{33}$

$\frac{4}{11}\cdot\frac{3}{3}=\frac{12}{33}$

$\frac{11}{33}<\frac{12}{33}$ so the pic on the right is correct!

12.1 WP #4

1b (10pts) $x-3y=-9 \Rightarrow x=3y-9$

$4x-11y=-32$

$\Rightarrow 4x-11y=4(3y-9)-11y=-32$

$12y-36-11y=-32$

$y=4$

$\Rightarrow x=3y-9=3(4)-9=12-9=3=x$

$(x,y)=(3,4)$ Sol'n set: $(x,y)\in\{(3,4)\}$

1c E1 $x-3y=-9$

E2 $4x-11y=-32$

$-4E1+E2 \Rightarrow$

$-4E1 \quad -4x+12y=36$

$4x-11y=-32$

$y=4$

$y=4 \rightarrow x-3y=x-3(4)=-9$

$\Rightarrow x-12=-9$

$\Rightarrow x=3 \Rightarrow (x,y)=(3,4)$

121 WP #4

(2) (10pts)

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

$-3E1+E2$:

$-3E1$: $-3x-6y = 3$

$E2$: $3x+7y-z=-6$

$y-z=-3$

$2E1+E3$:

$2E1$: $2x+4y = -2$

$E3$: $-2x-6y+3z=9$

$-2y+3z=7$

NEW SYSTEM:

$E1$ $x+2y = -1$

$E2$ $y-z=-3$

$E3$ $-2y+3z=7$

$2E2+E3$:

$2E2$: $2y-2z=-6$

$E3$: $-2y+3z=7$

$z=1$

NEW SYSTEM:

$x+2y = -1$

$y-z=-3$

$z=1$

$\rightarrow y-z=y-1=-3 \rightarrow y=-2$

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

$\rightarrow x-4=-1$

$\rightarrow x=3$

$(x,y)=(3,-2,1)$

OR $(x,y) \in \{(3,-2,1)\}$

121 WP#4

(3) @ (10pts)

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

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

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

$-3E1 + E2$:

$-3E1$: $-3x - 9y + 6z = -9$

E2: $3x + 7y - 7z = 11$

$-2y - z = 2$

$-2E1 + E3$:

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

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

$-2y - z = 2$

NEW SYSTEM:

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

E2 $-2y - z = 2$ } SAME!

E3 $-2y - z = 2$

Collapses to:

$x + 3y - 2z = 3$

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

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

$\boxed{y = -\frac{1}{2}z - 1}$

$\Rightarrow x + 3\left(-\frac{1}{2}z - 1\right) - 2z = 3$

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

$x - \frac{7}{2}z - 3 = 3$

$x - \frac{7}{2}z = 6$

$x = \frac{7}{2}z + 6$

$\boxed{\frac{7}{2}z + 6 = x}$

Soln Set:

$\{(x, y, z) \mid x$ MEH.

NEXT PAGE....

121 WP #4

(3a) cnt'd

Soln Set:

$$\left\{ (x, y, z) \;\middle|\; x = \tfrac{7}{2}z + 6,\ y = -\tfrac{1}{2}z - 1,\ z \in \mathbb{R} \right\}$$

(3b) (10pts) Particular Solns:

$z = 0$:

$x = \frac{7}{2}(0) + 6 = 6$

$y = -\frac{1}{2}(0) - 1 = -1$

$\rightsquigarrow (6, -1, 0)$

$z = 1$:

$x = \frac{7}{2}(1) + 6 = \frac{7}{2} + \frac{12}{2} = \frac{19}{2} = x$

$y = -\frac{1}{2}(1) - 1 = -\frac{1}{2} - \frac{2}{2} = -\frac{3}{2} = y$

$\rightsquigarrow \left(\frac{19}{2}, -\frac{3}{2}, 1\right)$

$z = -1$:

$x = \frac{7}{2}(-1) + 6 = -\frac{7}{2} + \frac{12}{2} = \frac{5}{2} = x$

$y = -\frac{1}{2}(-1) - 1 = \frac{1}{2} - \frac{2}{2} = -\frac{1}{2} = y$

$\left(\frac{5}{2}, -\frac{1}{2}, -1\right)$

121 WP #4

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

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

E3 $2x + 4y - 5z = 9$

$-3E1 + E2$:

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

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

$-2y - z = 2$

$-2E1 + E3$

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

E3 $2x + 4y - 5z = 9$

$-2y - z = 3$

NEW SYSTEM:

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

E2 $-2y - z = 2$ } See the problem? Keep going.

E3 $-2y - z = 3$

$-E2 + E3$:

$-E2$: $2y + z = -2$

E3: $-2y - z = 3$

$0 = 1$? Absurd!

Therefore, there is no solution

(or I made a boo-boo, somewhere.)