9/24/19

3.1 Solving Linear Systems by Graphing

System of 2 linear equations you have x & y in 2 or more equations.

- **Solution:** (x, y) coordinate that satifies each equation

P1 Checking a given solution

Check (2, 2) is a solution... yes

x y

$3x-2y=2$ & $x+2y=6$ (or)

- $3(2)-2(2)=2$ & $2+2(2)=6$
- $6-4=2$ $2+4=6$
- $2=2$ $6=6$

P2 Solve by Graphing

Hint: Rewrite all equations as $y=mx+B$

ie1

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

$-2x$ $-2x$ | $-x$ $-x$

$-3y=-2x+1$

$\div -3$ $\div -3$

$y=\frac{2}{3}x-\frac{1}{3}$ | $y=-1x+3$

Step 1: Graph the equations

Step 2: 2ND | calc | 5: | entr

Step 3: entr | entr | entr

A: (2,1)

ie 2

$$\begin{cases} 2x-2y=-8 \\ 2x+2y=4 \end{cases}$$

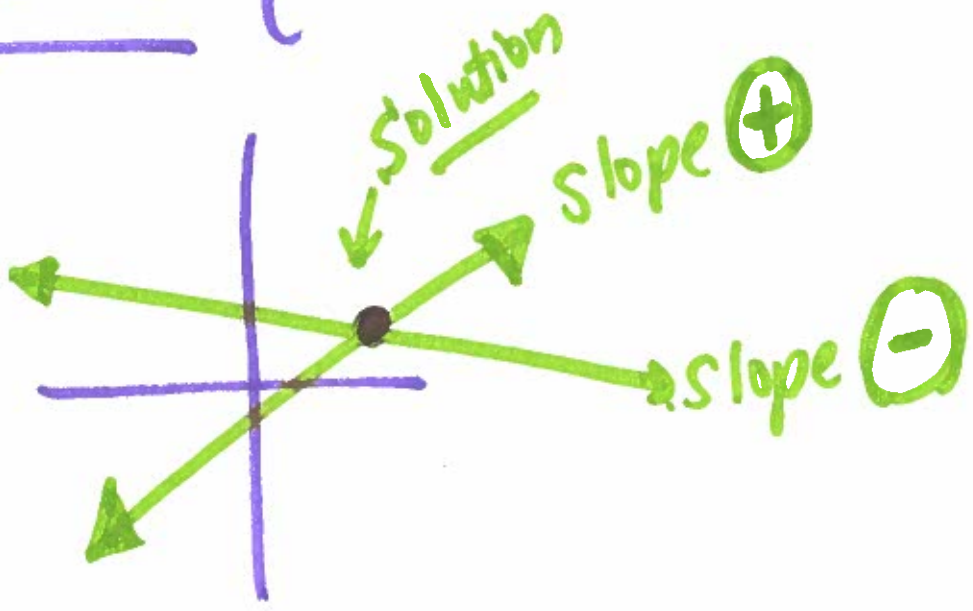
$-2x$ $-2x$ $-2x$ $-2x$

$$\frac{-2y}{-2}=\frac{-2x}{-2}-\frac{8}{-2} \qquad \frac{2y}{2}=\frac{-2x}{2}+\frac{4}{2}$$

$$y=1x+4 \qquad y=-1x+2$$

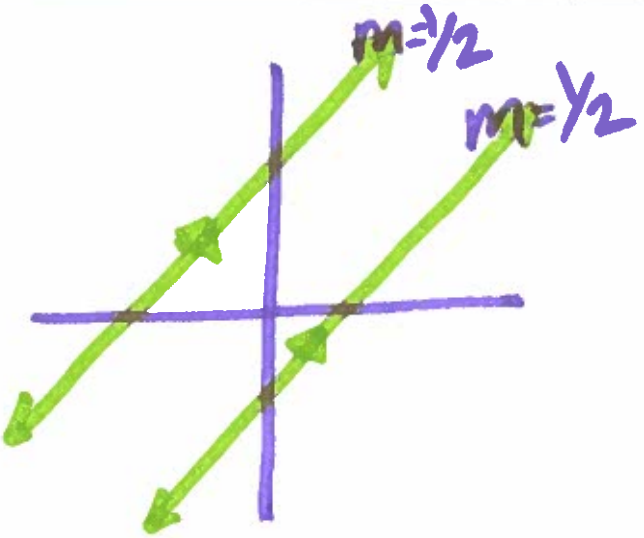
$(-1, 3)$

ONE solution: (one coordinate)



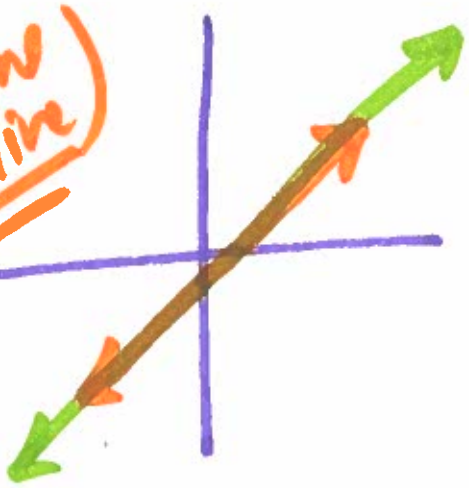
No Solution:

(Slopes same)



Many Solutions. (same line)

same equation



Ex 3

$3x-2y=6$ $-3x$ $-3x$

$-2y=-3x+6$

$\frac{-2y}{-2}=\frac{-3x}{-2}+\frac{6}{-2}$

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

$6x-4y=12$ $-6x$ $-6x$

$-4y=-6x+12$

$\frac{-4y}{-4}=\frac{-6x}{-4}+\frac{12}{-4}$

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

Same equations

many solutions

Ex 4

$3x-2y=6$ $-3x$ $-3x$

$-2y=-3x+6$

$\frac{-2y}{-2}=\frac{-3x}{-2}+\frac{6}{-2}$

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

$3x-2y=2$ $-3x$ $-3x$

$-2y=-3x+2$

$\frac{-2y}{-2}=\frac{-3x}{-2}+\frac{2}{-2}$

$y=\frac{3}{2}x-1$

No solution

same slope

9/27/19

3.2 Solve Linear Systems Algebraically

P1: Substitution

Step1: Solve 1 equation for one of its variables.

Step2: Substitute expression from Step 1 into the other equation and solve for other variable

Step3: Substitute value from step 2 into the equation (revised) from step 1 and solve.

ic1

$3x+4y=-4$ $\quad x+2y=2$

Step 2

$3x+4\left(-\frac{1}{2}x+1\right)=-4$

$3x-2x+4=-4$

$x+4=-4$

$-4 \quad -4$

$x=-8$

$-x \quad -x$

$\frac{2y}{2}=\frac{-1x+2}{2}$

Step 1

$y=-\frac{1}{2}x+1$

Step 3 $x=-8$

$x+2y=2$

$-8+2y=2$

$+8 \quad +8$

$\frac{2y}{2}=\frac{10}{2}$

$y=5$

$(-8,5)$

P2 Linear Combination Method

Step 1: Multiply 1 or both equations by a constant to obtain coefficients that differ in sign only

Step 2: Add the revised equation from Sty
1. Combine like terms will eliminate one of the variables. Solve remaining variables.

Step 3: Substitute that value obtained in step 2 into the original and solve.

#1 $-2(2x-4y=13)$

$4x-5y=8$

elimination

(X) or Y

☺ X

$-4x+8y=-26$

$4x-5y=8$

Step 1

Step 2

$y=-6$

$3y=-18$

$\frac{3y}{3}=\frac{-18}{3}$

Step 3 $y=-6$

$2x-4y=13$

$2x-4(-6)=13$

$2x+24=13$

$-24\quad -24$

$\frac{2x}{2}=\frac{-11}{2}$

$x=-5.5$

(-5.5, -6)

ie 2

$5(2x+3y=-1)$

$-3(-5x+5y=15)$

Eliminate x or y

$10x+15y=-5$

$15x-15y=-45$

$25x=-50$

$\div 25 \quad \div 25$

$x=-2$

$y=1$

$(-2,1)$

$x=-2$

$2x+3y=-1$

$2(-2)+3y=-1$

$-4+3y=-1$

$+4 \quad +4$

$3y=3$

$\frac{3y}{3}=\frac{3}{3}$

$y=1$

10/22/19

3.3 Graphing and Solving Systems of Linear Inequalities

Solution of Linear inequalities:

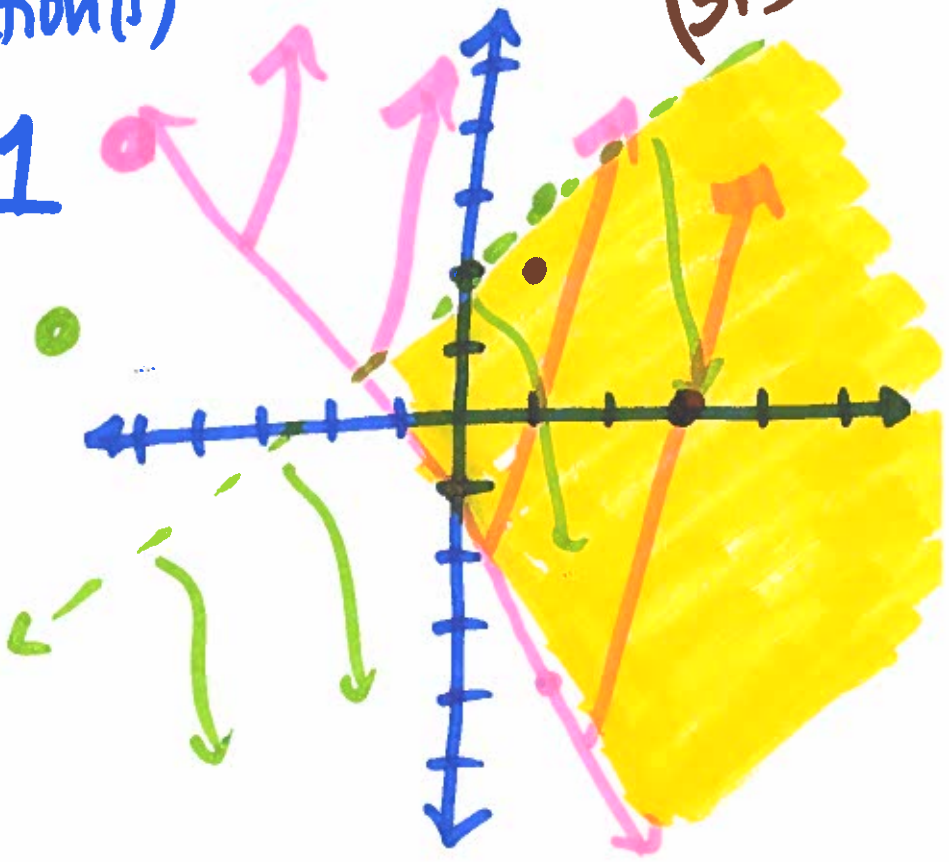
Ordered pair (x, y) within the shaded region(s) of the inequality.

(1,2)
(3,0)

(ie 1) Graph the solution(s)

solid $y \geq -3x - 1$

dotted $y < x + 2$



#12

$x \geq 0$

$y \geq 0$

$4x + 3y \leq 24$

$-4x \quad -4x$

$\frac{3y}{3} \leq \frac{-4x}{3} + \frac{24}{3}$

$y \leq -\frac{4}{3}x + 8$

solution

(2,2)

HWK: pgs. 159-160 #1-25 odds

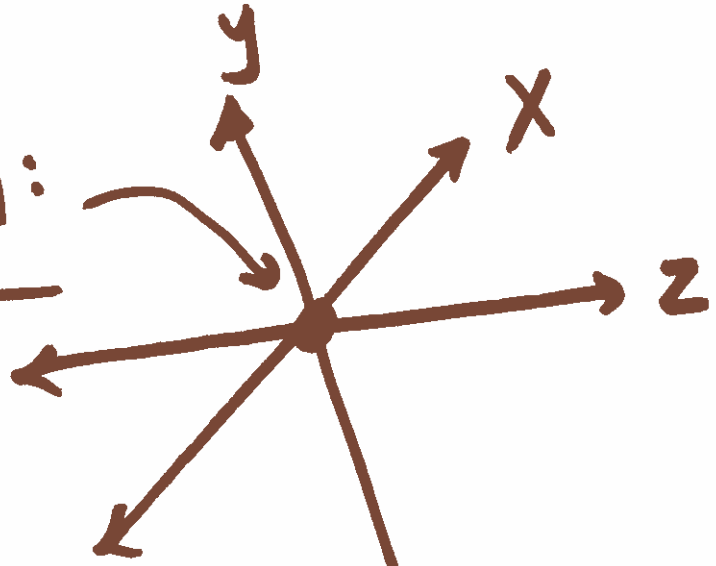
10/28/19

3.6 Systems of 3 Variabl

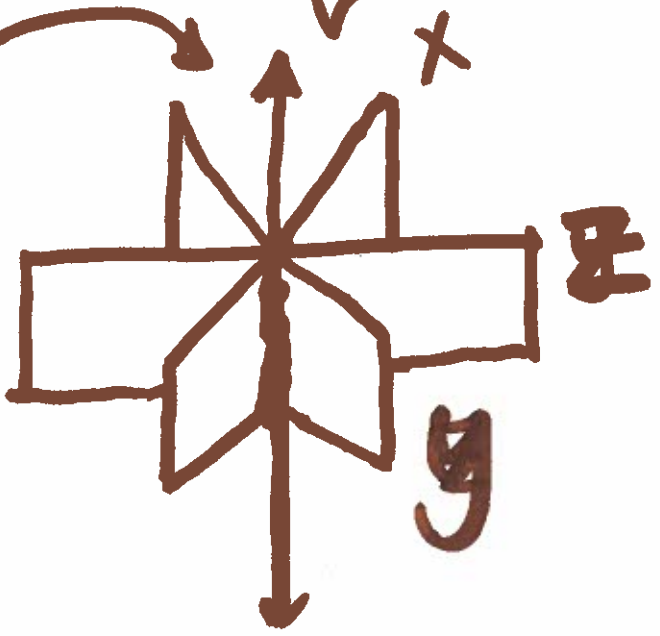
Ordered Triple: one solution, many solutions, or no solution

(x, y, z)

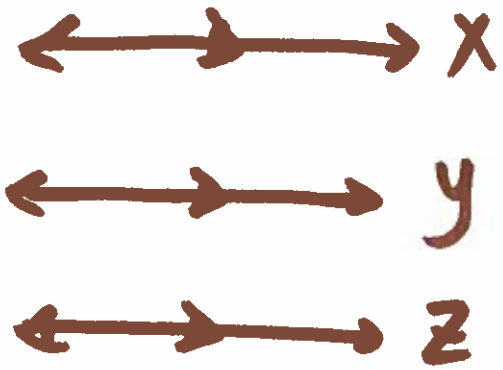
- one solution:

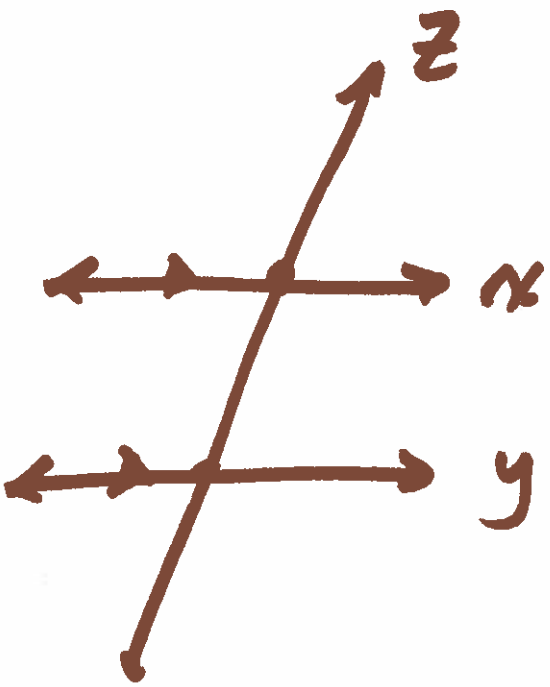


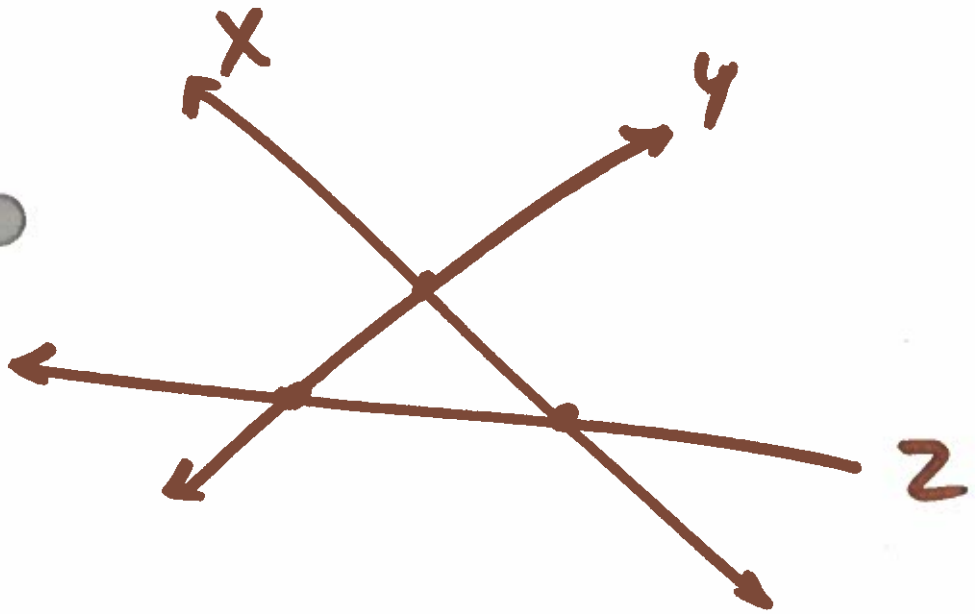
- many solutions (plane)



No solutions







#1

$$3x-2y+4z=35 \quad (1)$$
$$-4x+y-5z=-36 \quad (2)$$
$$5x-3y+3z=31 \quad (3)$$

Step 1

use #1 & 2 & eliminate a letter

y

$$3x-2y+4z=35$$
$$2(-4x+y-5z=-36)$$

$$3x-2y+4z=35$$
$$-8x+2y-10z=-72$$

$$-5x-6z=-37$$

Answer 1 & 2

$-4x+y-5z=-36$ (2)

$5x-3y+3z=31$ (3)

Step 2
use 2 & 3
& eliminate
your letter
(y)

$-12x+3y-15z=-108$

$5x-3y+3z=31$

$-7x-12z=-77$

Answer
2 & 3

$-2(-5x-6z=-37)$ (A: 1:2)

$-7x-12z=-77$ (A: 3:4)

Skp 3

use equation for Answer of (1,2) & equation Answer of 2,3)

(z)

$10x+12z=74$

$-7x-12z=-77$

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

$x=-1$

$-5x-6z=-37$

$-7x-12z=-77$

Step 4

Solve for

z

pick an equation

(letter remaining in step 3)

when $x=-1$

$-5(-1)-6z=-37$

$5-6z=-37$

$-5 \quad -5$

$\frac{-6z}{-6}=\frac{-42}{-6}$

$z=7$

$3x-2y+4z=35$ ①

Step 5

Substitute the 2 values you found into 1 of the original problems (#1, #2, #3)

$3(-1)-2y+4(7)=35$

$-3-2y+28=35$

$25-2y=35$

$-25 \quad -25$

$\frac{-2y}{-2}=\frac{10}{-2}$

$y=-5$

$x=-1$

$z=7$

$(-1,-5,7)$

3.6 Solving 3 Variables (day 3)

10/30/19

ic 1

$$3x + 2y - 1z = 8 \quad R1$$

(12)

$$-3x + 4y + 5z = -14 \quad R2$$

$$1x - 3y + 4z = -14 \quad R3$$

	C1	C2	C3	C4
R1	3	2	-1	8
R2	-3	4	5	-14
R3	1	-3	4	-14

RxC

3x4

$$\begin{bmatrix} 1 & 0 & 0 & 1 \\ 0 & 1 & 0 & 1 \\ 0 & 0 & 1 & -3 \end{bmatrix}$$

$$(1, 1, -3)$$

14) $3x+2y-3z=-2$

$7x-2y+5z=-14$

$2x+4y+1z=6$

Steps

1.) 2ND matrix

2.) edit 3x4 enter

fill in all numbers into Matrix 3x4

3.) 2ND quit

4.) 2ND matrix math

B↓rrefl enter

5.) 2ND matrix 1: enter enter

$x=-1.6923$ $y=2.2307$

$z=0.4615$

18.) $-2x+1y+6z=1$

$3x+2y+5z=16$

$7x+3y-4z=11$

pgs. 181-182
12-26 evens

$\left(\frac{4}{x}, \frac{-3}{y}, \frac{2}{z}\right)$