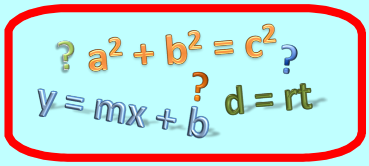
Math 115

Fall 2018

Lecture 12



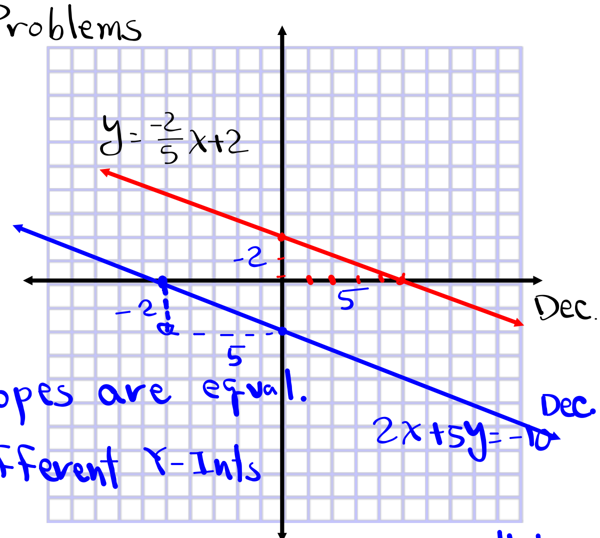
Feb 19-8:47 AM

Some warm up Problems

Graph

$$\begin{cases} y = \frac{-2}{5}x + 2 \\ 2x + 5y = -10 \end{cases}$$

x	y
0	-2
-5	0



Slopes are equal.

Different Y-Ints

These two lines are parallel.

Nov 8-6:05 AM

Graph

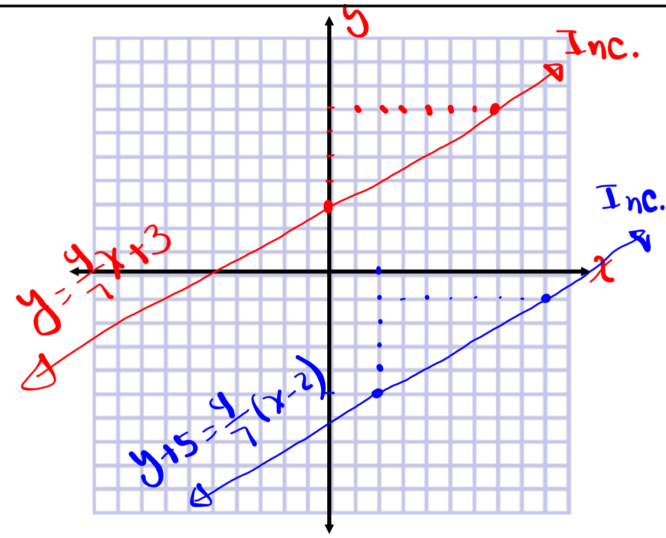
$$\begin{cases} y = \frac{4}{7}x + 3 \\ y + 5 = \frac{4}{7}(x-2) \end{cases}$$

$y+5=0$

$y=-5$

$x-2=0$

$x=2$



Same slope

Different Y-Int. $\Rightarrow$ Parallel lines

Nov 8-6:12 AM

Graph

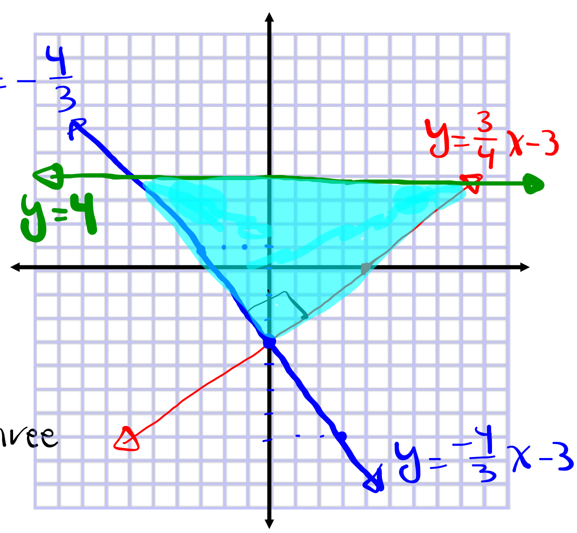
$y=\frac{3}{4}x-3$,

$y=\frac{-4}{3}x-3$,

and $y=4$

Shade the region that is bounded by all three lines.

$\frac{-4}{3}=\frac{4}{-3}=-\frac{4}{3}$



$\frac{3}{4}\cdot\frac{-4}{3}=\frac{-12}{12}=-1$

Nov 8-6:19 AM

Find eqn of a line that contains $(-5, 7)$ with

1) Zero slope

$m = 0$, H.L., y-only

$\boxed{y = 7}$

2) No slope

undefined slope, V.L., x-only $\boxed{x = -5}$

3) $m = -2$

$y - y_1 = m(x - x_1)$

$y - 7 = -2(x - -5)$

$y - 7 = -2x - 10$

$\boxed{y = -2x - 3}$ Slope-Int. form

$\boxed{2x + y = -3}$ stand. form

4) $m = \frac{3}{5}$

$y - y_1 = m(x - x_1)$

$y - 7 = \frac{3}{5}(x - -5)$

$y - 7 = \frac{3}{5}x + 3$

$\boxed{y = \frac{3}{5}x + 10}$

$5y = 3x + 50$

$-3x + 5y = 50$

$\boxed{3x - 5y = -50}$

Nov 8-6:26 AM

Find eqn of a line that contains $(3, 0)$ and

1) $(7, 0), (3, 0)$

$m = \frac{0 - 0}{7 - 3} = \frac{0}{4} = 0$

$\boxed{y = 0}$

$m = \frac{y_1 - y_2}{x_1 - x_2}$

2) $(3, -5), (3, 0)$

$m = \frac{-5 - 0}{3 - 3} = \frac{-5}{0}$ und.

$\boxed{x = 3}$

3) $(0, 4)\ (3, 0)$

$m = \frac{4 - 0}{0 - 3} = \frac{4}{-3} = \boxed{\frac{-4}{3}}$

$y - y_1 = m(x - x_1)$

$y - 4 = \frac{-4}{3}(x - 0)$

$\boxed{y = \frac{-4}{3}x + 4}$

$3y = -4x + 12$

$\boxed{4x + 3y = 12}$

4) $(-2, 7), (3, 0)$

$m = \frac{7 - 0}{-2 - 3} = \frac{7}{-5} = \boxed{\frac{-7}{5}}$

$y - y_1 = m(x - x_1)$

$y - 0 = \frac{-7}{5}(x - 3)$

$\boxed{y = \frac{-7}{5}x + \frac{21}{5}}$

$5y = -7x + 21$

$\boxed{7x + 5y = 21}$

Nov 8-6:35 AM

find eqn of a line that contains $(-2,4)$ and is parallel to the line $3x-2y=8$.

$$y-y_1=m(x-x_1)$$

$$-2y=-3x+8$$

$$y=\frac{-3}{-2}x+\frac{8}{-2}$$

$$y=\boxed{\frac{3}{2}}x-4$$

$$y-4=\frac{3}{2}(x--2)$$

$$y-4=\frac{3}{2}x+3$$

$$\boxed{y=\frac{3}{2}x+7}$$

Slope-Int. Form

$$2y=3x+14$$

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

$$\boxed{3x-2y=-14}$$

Standard form

Nov 8-6:48 AM

find eqn of aline that contains $(-4,-3)$ and is perpendicular to the line $4x+5y=-8$.

$$5y=-4x-8$$

$$y=\boxed{\frac{-4}{5}}x-\frac{8}{5}$$

$-$ Reciprocal $=-\left(\frac{-5}{4}\right)$

our new line has slope $\frac{5}{4}$

Now use Point-Slope Formula

$5-3=2$

$$y-y_1=m(x-x_1)$$

$$y--3=\frac{5}{4}(x--4)$$

$$y+3=\frac{5}{4}(x+4)$$

$$y+3=\frac{5}{4}x+\frac{5}{\cancel{4}}\cdot\cancel{4}$$

$$\boxed{y=\frac{5}{4}x+2}$$

Slope-Int. form

$$4y=5x+8$$

$$-5x+4y=8 \rightarrow \boxed{5x-4y=-8}$$

Standard form

Nov 8-6:52 AM

So far, we have done ch. 1, 2, and 3.

Ch. 8 System of linear equations in two Variables.

$\begin{cases} 2x-3y=6 \\ x=y+4 \end{cases}$ $\begin{cases} x+y=5 \\ x-y=-1 \end{cases}$ $\begin{cases} y=\frac{3}{4}x-2 \\ y=\frac{-2}{5}x+3 \end{cases}$

The Solution, if exists, is an ordered-pair that Satisfies both equations in the System.

ex: Is $(2,3)$ a Solution for $\begin{cases} 3x+y=9 \\ x-y=-1 \end{cases}$?

we plug in the ordered-Pair in both eqns. If both results are true $\to$ Yes

If at least 1 fails $\to$ NO

$3x+y=9$

$3(2)+3=9$

$6+3=9$ ✓

$x-y=-1$

$2-3=-1$ ✓

Yes $(2,3)$ is a Solution.

Nov 8-7:32 AM

Is $(-2,5)$ a Solution of

$\begin{cases} 3x+2y=4 \checkmark \\ 2x-y=9 \times \end{cases}$?

$3x+2y=4$

$3(-2)+2(5)=4$

$-6+10=4$ ✓

$2x-y=9$

$2(-2)-5=9$

$-4-5=9$

$-9=9$

False

$(-2,5)$ is not a Solution.

Nov 8-7:38 AM

How to Solve system of linear equations in two-Variables:

1) Graphing

2) Substitution

3) Addition/Elimination

4) There are other methods that You learn in other math classes.

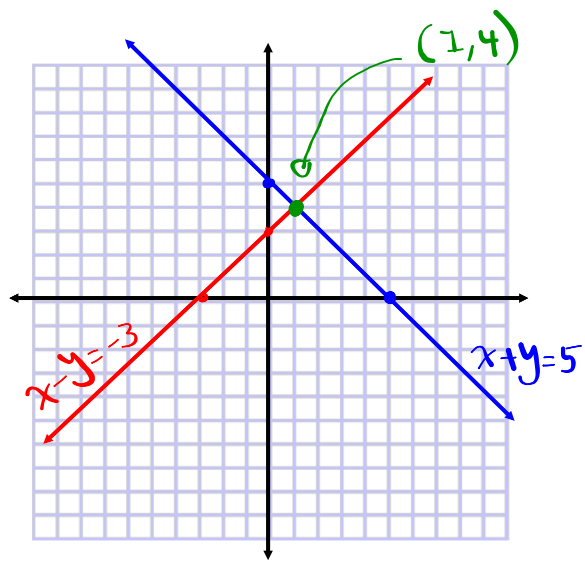
Nov 8-7:42 AM

Solve by graphing:

$$\begin{cases} x + y = 5 \\ x - y = -3 \end{cases}$$

x	y
0	5
5	0

x	y
0	3
-3	0



Our Solution is (1,4).

$\{(1,4)\}$

Nov 8-7:44 AM

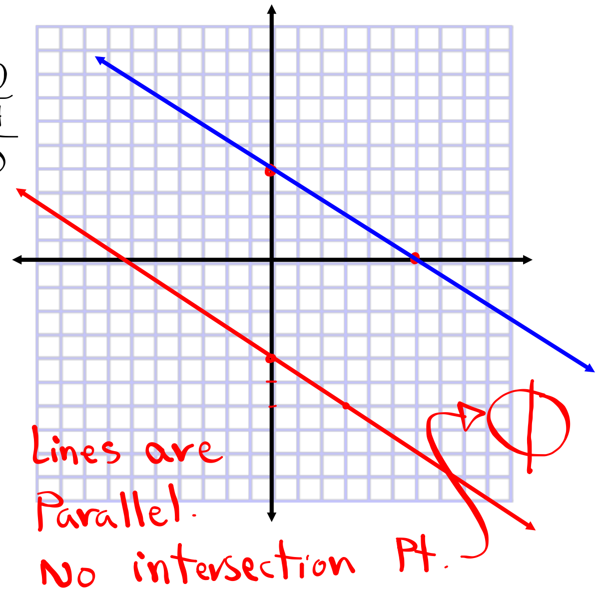
Solve by graphing

$$\begin{cases} 2x + 3y = 12 \\ y = \frac{-2}{3}x - 4 \end{cases}$$

x	y
0	4
6	0

Y-Int $(0,-4)$

$m = \frac{-2}{3}$



Nov 8-7:49 AM

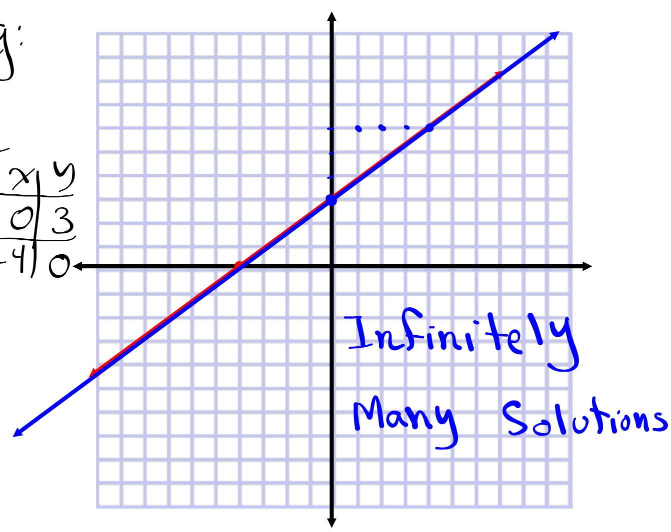
Solve by graphing:

$$\begin{cases} 3x - 4y = -12 \\ y = \frac{3}{4}x + 3 \end{cases}$$

x	y
0	3
-4	0

Y-Int $(0,3)$

$m = \frac{3}{4}$



Nov 8-7:54 AM

Solve by Substitution

$$\begin{cases} 3x - 2y = 5 \\ y = x - 3 \end{cases}$$

$$3x - 2(x - 3) = 5$$

$$3x - 2x + 6 = 5$$

$$x = 5 - 6$$

$$\boxed{x = -1}$$

$$y = -1 - 3 \qquad \boxed{y = -4}$$

$$\boxed{(-1, -4)}$$

$$\{(-1, -4)\}$$

Nov 8-8:00 AM

Solve by Subs. method

$$\begin{cases} x - 2y = 5 \\ y = \frac{1}{2}x - 4 \end{cases} \rightarrow x - 2\left(\frac{1}{2}x - 4\right) = 5$$

$$x - 2 \cdot \frac{1}{2}x + 2 \cdot 4 = 5$$

$$\cancel{x} - \cancel{x} + 8 = 5$$

$$8 = 5$$

False

No Solution $\qquad \phi$

Nov 8-8:05 AM

Solve by Subs.

$$\begin{cases} 3x - 5y = 15 \\ y = \frac{3}{5}x - 3 \end{cases}$$

$\rightarrow 3x - 5\left(\frac{3}{5}x - 3\right) = 15$

Distribute

$3x - \cancel{5} \cdot \frac{3}{\cancel{5}}x + 15 = 15$

$\cancel{3x} - \cancel{3x} + 15 = 15$

infinitely Many Solutions

$15 = 15$

True

Nov 8-8:10 AM

Solve by addition/Elimination:

$$\begin{cases} x + y = 5 \\ x - y = -3 \end{cases}$$

$2x = 2$

$x = \frac{2}{2}$ $\boxed{x = 1}$

$1 + y = 5$

$y = 5 - 1$

$\boxed{y = 4}$

Final Ans.

$(1, 4)$

$\{(1, 4)\}$

Nov 8-8:14 AM

Solve by addition/elimination

$$2\begin{cases} 3x + 2y = 9 \\ x - y = 3 \end{cases} \Rightarrow \begin{cases} 3x + 2y = 9 \\ 2x - 2y = 6 \end{cases}$$

$$5x = 15$$

$$\boxed{x = 3}$$

$$3 - y = 3$$

$$-y = 3 - 3 \Rightarrow -y = 0$$

$$\boxed{y = 0}$$

$$(3, 0)$$

$$\{(3, 0)\}$$

Nov 8-8:17 AM

Solve by addition/elimination method:

$$\begin{matrix} 3 \\ 4 \end{matrix}\begin{cases} 5x - 4y = 8 \\ 2x + 3y = -6 \end{cases} \Rightarrow \begin{cases} 15x - 12y = 24 \\ 8x + 12y = -24 \end{cases}$$

$$23x = 0$$

$$x = \frac{0}{23} \qquad \boxed{x = 0}$$

$$2(0) + 3y = -6$$

$$0 + 3y = -6$$

$$y = \frac{-6}{3} \qquad \boxed{y = -2}$$

$$(0, -2) \Rightarrow \{(0, -2)\}$$

Nov 8-8:22 AM

Find two complementary angles such that one of them is $\underbrace{10^\circ \text{ less than}}$ three times the other one.

x & $90-x$

65° & 25°

$$x = 3(90-x) - 10$$
$$x = 270 - 3x - 10$$
$$x + 3x = 270 - 10$$
$$4x = 260$$
$$\boxed{x = 65}$$

$$90 - x = 3x - 10$$
$$-x - 3x = -10 - 90$$
$$-4x = -100$$
$$\boxed{x = 25}$$

25° & 65°

Nov 8-8:49 AM

Find two supplementary angles such that one of them is $\underbrace{20^\circ \text{ more than}}$ 3 times the other one.

x° & $(180-x)^\circ$

$\boxed{140^\circ \text{ \& } 40^\circ}$

$$x = 3(180-x) + 20$$
$$x = 540 - 3x + 20$$
$$x + 3x = 560$$
$$4x = 560$$
$$\boxed{x = 140}$$

$$180 - x = 3x + 20$$
$$-x - 3x = 20 - 180$$
$$-4x = -160 \rightarrow \boxed{x = 40}$$

40° & 140°

Nov 8-8:57 AM

Find an angle such that the sum of twice its complement and 3 times its supplement equals 360°.

Angle → x

Complement → $90-x$

Supplement → $180-x$

$2\cdot \text{Comp.} + 3\cdot \text{Suppl.} = 360$

$2(90-x) + 3(180-x) = 360$

$180-2x + 540 - 3x = 360$

$-5x + 720 = 360$

$-5x = 360 - 720$

$-5x = -360$

$x = 72$

72°

Nov 8-9:02 AM

Find an angle such that the difference of 3 times its supplement and 7 times its complement is equal to 70°.

Angle → x

Comp. → $90-x$

Suppl. → $180-x$

$3\cdot \text{Suppl.} - 7\cdot \text{Comp.} = 70$

$3(180-x) - 7(90-x) = 70$

$540 - 3x - 630 + 7x = 70$

$4x - 90 = 70$

$4x = 160$ $\boxed{x=40}$

40°

Nov 8-9:09 AM

In triangle ABC, Angle B is twice angle A.

Angle C is 4° more than 5 times angle A.

Find all three angle.

$\angle A = x$

$\angle B = 2x$

$\angle C = 5x + 4$

$A + B + C = 180°$

$x + 2x + 5x + 4 = 180$

$8x = 180 - 4$

$8x = 176$

$\boxed{x = 22}$

22°, 44°, and 114°

Nov 8-9:14 AM

Exam 2 : Next Thursday

In Your Package
go to Points & Lines
work on Problems 1 – 50.
It is due next Thursday

SG 8 & 9, and 10 Due Tuesday

No School on Monday

Also work on Angles & Triangles Problems
This will be due on Wednesday.

Nov 8-9:18 AM