2.2 Solving Linear Systems by Graphing

A system of linear equations is a group of two or more linear equations.

The solution to a system is any point that **satisfies** BOTH (or all) equations in the system. *The solution is the point of intersection.*

To solve systems by graphing:

1. Graph each line on the same set of axes.
2. Estimate the point of intersection.
3. Check that your estimation satisfies both equations (ie. check that LS=RS for **both**).

Ex. 1 At the Perth Fair, Sam bought 5 doughnuts and 3 candy apples for $7.75. Rowan bought 8 doughnuts and 2 candy apples for $7.50.

Mr. Adams says candy apples are $1.25 each and doughnuts are

$0.80 each. Ms. Taylor says that the doughnuts were $0.50 and candy apples were $1.75 each. Who is right?

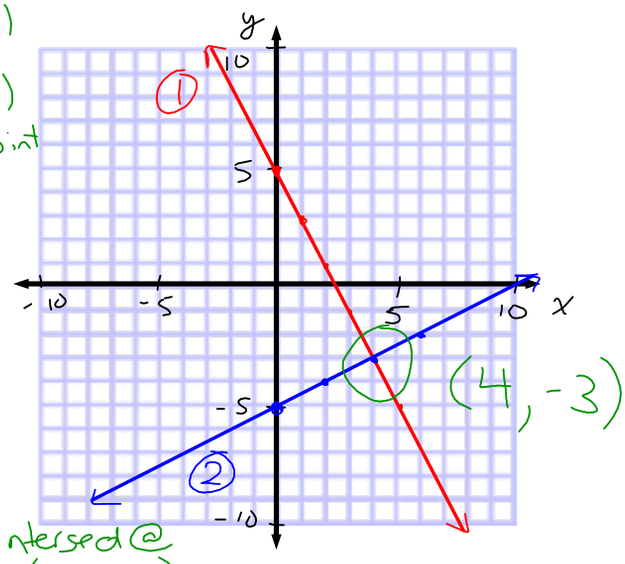
Example 2:
Solve by graphing.

- Plot y-int (b)
- Use slope (m) for next point

a. ① $2x + y = 5$
② $x - 2y = 10$

① $y = -2x + 5$ $\quad m = -\frac{2}{1}$ $\quad b = 5$

② $x - 10 = 2y$
$2y = x - 10$
$y = \frac{1}{2}x - 5$ $\quad m = \frac{1}{2}$ $\quad b = -5$



Intersect @ $\therefore (4, -3)$

b. ① $5x - 2y = 10$
② $x + 2y = 2$

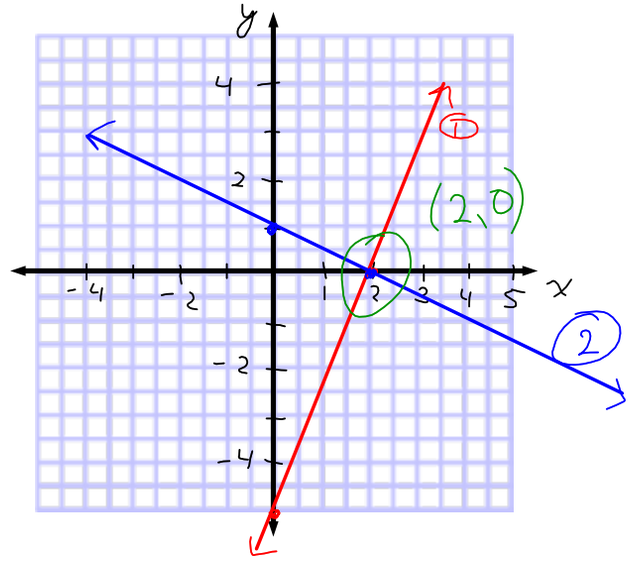
① By intercepts! $x = 0$ or $y = 0$

$x = 0$: $5(0) - 2y = 10$, $y = -5$, $\therefore (0, -5)$

$y = 0$: $5x - 2(0) = 10$, $x = 2$, $\therefore (2, 0)$

② $x = 0$: $0 + 2y = 2$, $y = 1$, $\therefore (0, 1)$

$y = 0$: $x + 2(0) = 2$, $x = 2$, $\therefore (2, 0)$



$\therefore$ Intersect @ $(2, 0)$

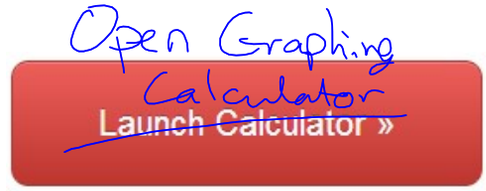
Using Desmos to Determine the Point of Intersection

Ex. 1 Use Desmos to determine the point of intersection for the following lines.

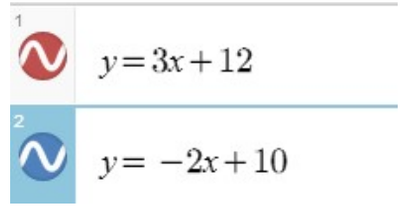
y = 3x + 12

y = -2x + 10

1. Go to https://www.desmos.com/ and click on



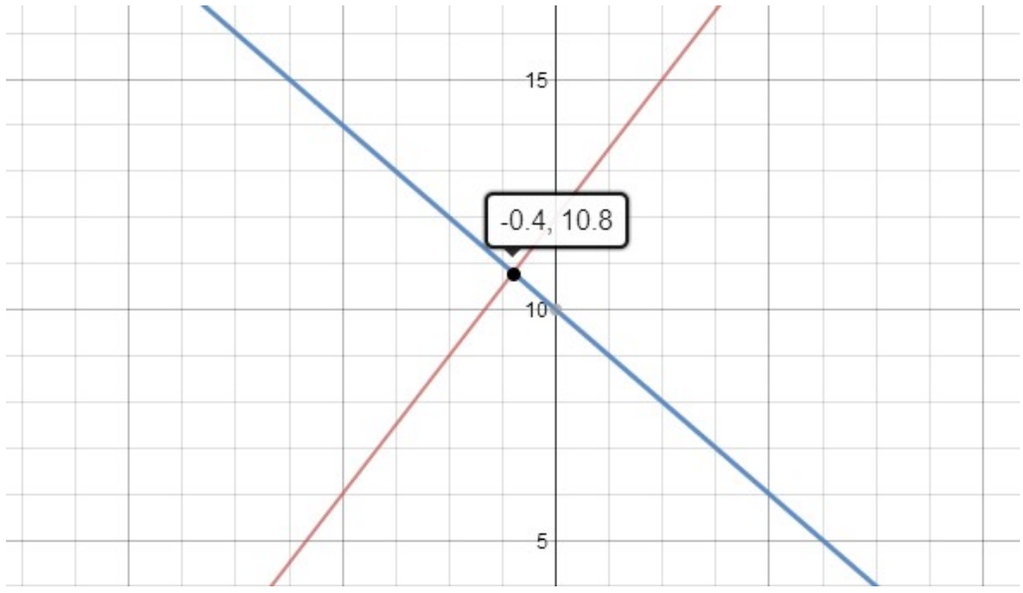
2. Enter the 1st equation on the first line. Click on the 2nd line and enter the 2nd equation.



3. Click on the wrench icon to change the graph settings.

Set up your window so that you can see where the lines cross.

4. Click on the point of intersection. Its coordinates will appear on the screen.



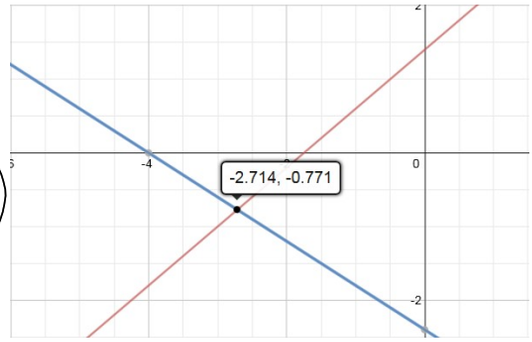
Using Technology to Determine the Point of Intersection

Use **desmos.com** to determine the point of intersection of the following systems.

a) $4x-5y=-7$

$-3x=12+5y$

$\sim(-2.7,-0.8)$

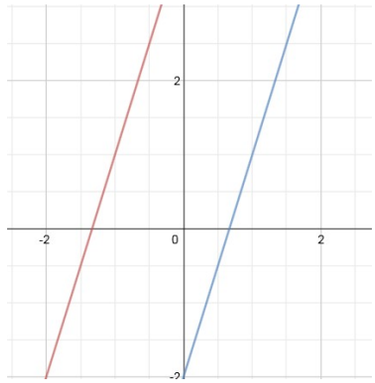


b) $y = 3x + 4$

$y = 3x - 2$

No solution!

(Lines are parallel, same m)

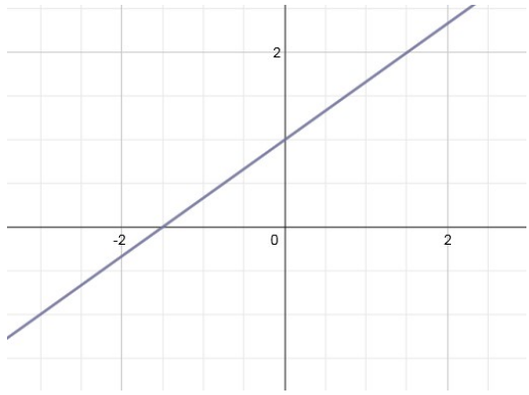


c) $y=\frac{2}{3}x+1$

$2x-3y=-3$

Same line!

∴ Infinite solutions



Practice:

Set 1: p. 17 #7,8ab,9ab,10a (DESMOS)

Set 2: p.17 #7,8d,9c,10be (DESMOS),20