BE-Algebra 2 | Thursday 9 -15 -11

NOTE: Registration for Oct. ACT is due Fri. 9-16

① On the same graph (make it neat, ~½ page, graph paper is best), graph these two lines:

Ⓐ $y = 2x + 9$

Ⓑ $x + y = 3$

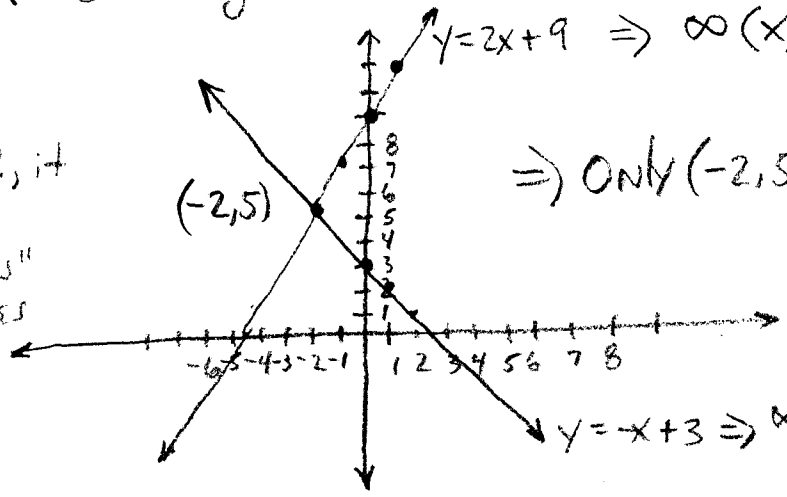
? Put Ⓑ in $y = mx + b$ form

② Where do these lines cross? i.e., (x, y)?

FYI {Latin id est = "that is"

$y = 2x + 9$ begin at $(0,9)$, $m = \frac{2}{1}$

$y = -x + 3$ begin at $(0,3)$, $m = -\frac{1}{1}$



When $x = -2$, it is the ONLY x that "drives" the both lines

$y = 2x + 9 \Rightarrow \infty$ (x, y) pairs $f(x) = 2x + 9$

$f(-2) = 2(-2) + 9$

$= 5$

$\Rightarrow$ ONLY $(-2, 5)$ is "ON" both lines

$y = -x + 3 \Rightarrow \infty$ (x, y) pairs

$f(x) = -x + 3$

$f(-2) = -(-2) + 3$

$= 5$

CAN WE SOLVE A SYSTEM of LINEAR EQUATIONS USING Algebra? GRAPHING IS SLOW, NOT ACCURATE.

Must use both equations, MUST eliminate x or y.

EBS ⇒ ELIMINATION BY SUBSTITUTION

EBA ⇒ ELIMINATION by ADDITION

Ex EBS

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

$y = (2x+9)$

$x + (2x+9) = 3$

$x + 2x + 9 = 3$

$3x = -6$

$x = -2$

$y = 2x + 9$

$y = 2(-2) + 9$

$y = 5$

STEP

① GET ONE of your x or y's by itself. Great, a y is already by itself

② EBS, TAKE $(2x+9)$ AND SUBSTITUTE for y

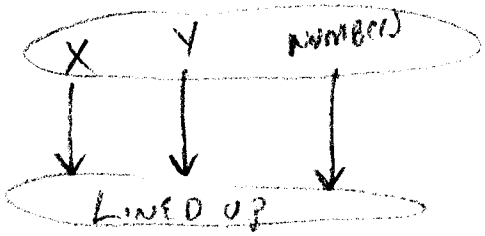
③ Solve, in this case for x

④ Use EITHER EQUATION TO find y. I chose $y = 2x + 9$

$(-2, 5)$ ← ANSWER

(Ex) EBA

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



$$2x - y = -9$$
$$x + y = 3$$

(+)

$$3x = -6$$

$$x = -2$$

$$y = 2(-2) + 9$$

$$y = 5$$

Step

① Get x and y's lined up. Standard Form is convenient, but get x, y, and numbers lined up. = put 1st equation into standard form

② Get equal and opposite coefficient for x or y. Already done for y!

③ Add Both Equations, Like to Like. Note: y is eliminated

④ Solve for x

⑤ Use either original equation to solve for y: $y = 2x + 9$

$(-2, 5)$ Answer

Substitution is easiest to grasp, you knows how to get one of the x or y's by itself if it is NOT done already. But what about EBA if you don't have equal and opposite coefficients?

(Ex) $4x - 2y = 22 \xrightarrow{(9)} 36x - 18y = 198$

$6x + 9y = -3 \xrightarrow{(2)} 12x + 18y = -6$

$48x = 192$

$x = 4$

$\therefore 9y = -3 - 24$ $y = -3$ $(4, -3)$

(Ex) $x + \frac{1}{2}y = 5 \Rightarrow 2x + y = 10$

$3y - 2x = 6 \quad -2x + 3y = 6$

$4y = 16$ $y = 4$

$x = 3$ $(3, 4)$

- Homework: Pg 120 # 13, 14, 19, 20, 25, 26, 27

Systems of Linear Equations – 2 Special Cases

Case 1 ⇒ Lines Parallel ⇒ No Solutions

(Ex)

$$\begin{cases} y = 2x - 6 \xrightarrow{(-1)} -y = -2x + 6 \\ y = 2x + 8 \rightarrow y = 2x + 8 \end{cases}$$

(+)

$$0 = 14 \quad \text{FALSE}$$

No Solutions

Case 2 ⇒ Same Line ⇒ Infinite Solutions

(Ex)

$$\begin{cases} y = 2x + 3 \xrightarrow{(-1)} -y = -2x - 3 \\ y = 2x + 3 \qquad y = 2x + 3 \end{cases}$$

(+)

$$0 = 0 \quad \text{TRUE}$$

∞ solutions