5.5 notes

Thursday, September 17, 2020 10:15 AM

Recall: methods to graph linear equations
① intercepts
② slope-intercept form: $y = mx + b$
* → plot 'b' on y-axis
→ follow $\frac{rise}{run}$ directions of 'm' slope.
→ when necessary, rearrange into $y = mx + b$ form.

Foundations and Pre-Calculus 10

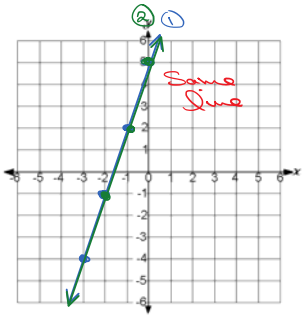
5.5 – Properties of Linear Systems

The Number of Solutions of a Linear System

Ex#1: Graph the following system of equations:

① $-3x + y = 5$
$+3x \quad +3x$
$y = 3x + 5$ → $m = \frac{3}{1}$ $b = 5$

② $-6x + 2y = 10$
$+6x \quad +6x$
$\frac{2y}{2} = \frac{6x}{2} + \frac{10}{2}$
$y = 3x + 5$ → $m = \frac{3}{1}$ $b = 5$



What do you notice about the graphs? (slopes? intercepts?)

The lines are the same. Same slope & same y-intercept.
coincident lines
$m_① = m_②$ $b_① = b_②$

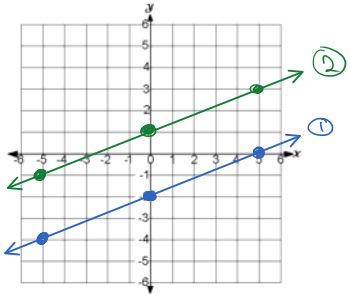
Where does the first equation intersect with the second equation? What is the solution? How many solutions are there to this system?

The lines intersect at every point. Therefore, there isn't just one solution but infinitely many solutions.

Ex#2: Graph the following system of equations:

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

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



What do you notice about the graphs? (slopes? intercepts?)

The lines are parallel. Same slope & different y-intercepts.
they never cross/intersect
$m_① = m_②$ $b_① \neq b_②$

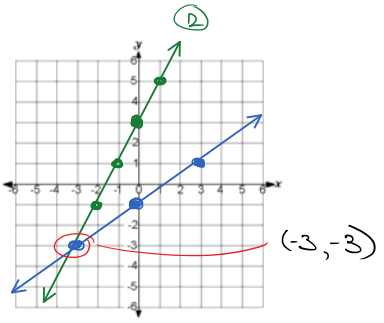
How many solutions to this system? How are the equations alike? How are they different?

There is no solution to this system because they never intersect. There is no solution when slopes are the same but y-intercepts are different.

Ex#3: Graph the following system of equations:

① $2x - 3y = 3$ → $2x - 3y = 3$, $-2x$, $-3y = -2x + 3$, -3, $y = \frac{2}{3}x - 1$, $m = \frac{2}{3}$ $b = -1$

② $-2x + y = 3$, $+2x$ $+2x$, $y = 2x + 3$, $m = \frac{2}{1}$ $b = 3$



What do you notice about the graphs?

They intersect at one point (-3,-3)

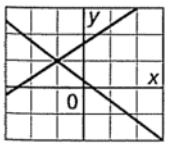
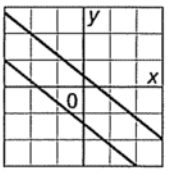
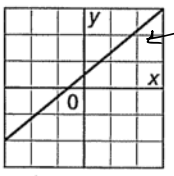
$m_① \neq m_②$ $b_① \neq b_②$ ← what if $b_① = b_②$?

At how many points does the graph of the first equation met the graph of the second? How are the equations alike? How are they different?

The lines meet one time at (-3,-3) which is the one and only solution. There is one solution when the slopes are different & the y-intercepts are either the same or different!

Summary:

Possible Solutions for a Linear System

Intersecting Lines	Parallel Lines	Coincident Lines
One solution	No solution	Infinite solutions
		
$m_① \neq m_②$	$m_① = m_②$	$m_① = m_②$
$b_① = a \neq b_②$	$b_① \neq b_②$	$b_① = b_②$

same line, one on top of the other.

HW: p448 #4-7