System of Linear Equations:

Two linear equations in the same variables.

Methods for solving a system of linear equations:

- Graphing
- Algebra
  a. Substitution
  b. Elimination
- Matrices

Solving a system of linear equations by graphing.

The solution is the point of intersection of the two lines.

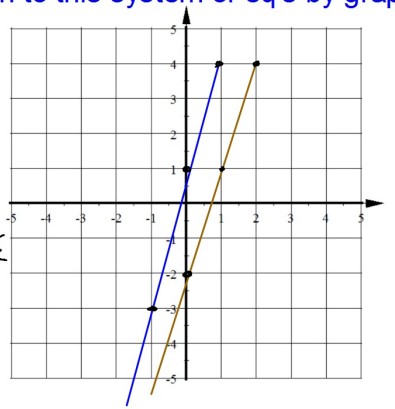
Find the solution to this system of eq's by graphing.

$y = 3x + 1$

$15x - 5y = 10$

$y = \frac{10 - 15x}{-5}$

$y = -2 + 3x$



There is no solution to this system of equations because the lines are parallel and parallel lines don't intersect.

How many solutions can a system of Linear Equations have?

1 Solution - this means - Lines Intersect
What is true about equations? Different Slopes

No Solution - this means - Lines are Parallel
What is true about equations? Same Slopes but different y - intercepts.

Many Solutions - this means - Same Lines
What is true about equations? Same slope and y-int.

Notice, these all start with finding the slope.
Only when the slopes are the same does the y-intercept matter.

How many solutions does this system of equations have?

$y = 3x - 11$ $\quad m = 3 \quad b = -11$

$6x - 2y = 28$ $\quad m = \frac{-6}{-2} = 3$ $\quad b = \frac{28}{-2} = -14$

No Solution
lines are parallel

How many solutions does this system of equations have?

$y = -5x + 4$ $\quad m = -5 \quad b = 4$

$10x + 2y = 8$ $\quad m = \frac{-10}{2} = -5$ $\quad b = \frac{8}{2} = 4$

Many solutions

these are the same line.

How many solutions does this system of equations have?

$y = 4x - 9$ $\quad m = 4 \quad b = -9$

$2x + 8y = 24$ $\quad m = \frac{-2}{8} = -\frac{1}{4}$

One Sol

Lines have different slopes

Our Vocalulary

Textbook's vocabulary:

One Solution → Independent

No Solution → Inconsistent

Many Solutions → Dependent

How many solutions does each system of linear equations have?

1. $y = 4x - 9$ $m = 4$

$y = -\frac{1}{4}x + 3$ $m = -1/4$

One Sol

Lines have different slopes

2. $y = 8x + 6$ $m = 8$ $b = 6$

$8x + y = 5$

$-8x \quad -8x$

$y = 5 - 8x$ $m = -8$ $b = 5$

One Sol

Lines have different slopes

How many solutions does each system of linear equations have?

3. $y = -3x + 2$ $m = -3$ $b = 2$

$9x + 3y = 6$

$-9x \quad -9x$

Many Sol's (same line)

$\frac{3y}{3} = \frac{6 - 9x}{3}$

$y = 2 - 3x$ $m = -3$ $b = 2$

4. $y = 2x - 8$ $m = 2$ $b = -8$

$4x - 2y = -16$

$-4x \quad -4x$

No Sol (lines are parallel)

$\frac{-2y}{-2} = \frac{-16 - 4x}{-2}$

$y = 8 + 2x$ $m = 2$ $b = 8$

Hwk #9. Sec 3-1

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Problems 38-43, 46-48, 52