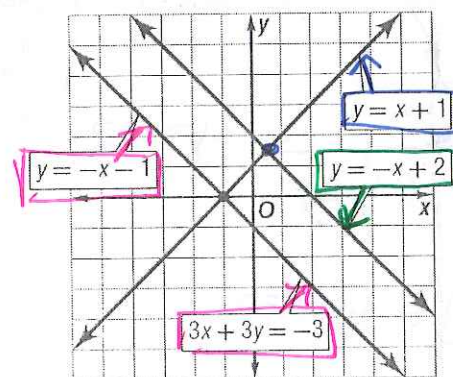# 6-1 Notes
Graphing Systems of Equations

Possible Number of Solutions Two or more linear equations involving the same variables form a **system of equations**. A solution of the system of equations is an ordered pair of numbers that satisfies both equations. The table below summarizes information about systems of linear equations.

Graph of a System	intersecting lines	same line	parallel lines
Number of Solutions	1 solution (different slopes)	Infinitely many solutions (same slope & same y intercept)	no solution (same slope & different y intercepts)
Terminology	consistent & independent	consistent & dependent	inconsistent

Example: Use the graph at the right to determine whether each system is *consistent* or *inconsistent* and if it is *independent* or *dependent*.

a. $y = -x + 2$ Intersecting lines / consistent & one solution / independent
   $y = x + 1$

b. $y = -x + 2$ parallel lines — / inconsistent
   $3x + 3y = -3$ no solution

c. $3x + 3y = -3$ same line! / Infinitely many solutions
   $y = -x - 1$ consistent & dependent

Exercises

Determine whether each system is *consistent* or *inconsistent* and if it is *independent* or *dependent*.

1. $y = -x - 3$
   $y = x - 1$

   different slopes —1 solution
   Consistent & independent

2. $2x + 2y = -6$ → $2y = -2x - 6$
   $y = -x - 3$ $y = -x - 3$

   same lines! Infinite solutions
   Consistent & dependent

3. $y = -x - 3$
   $2x + 2y = 4$ → $2y = -2x + 4$
                      $y = -x + 2$

   same slopes — different y intercepts —
   parallel = no solution
   inconsistent

6-1 Graphing Systems of Equations, cont.

Solve by Graphing One method of solving a system of equations is to graph the equations on the same coordinate plane.
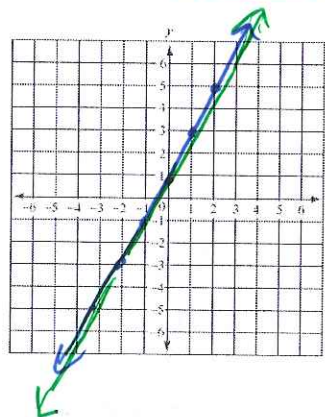
Example: Graph each system and determine the number of solutions that it has. If it has one solution, name it.

a. $x + y = 2$ → $y = -x + 2$

$x - y = 4$ → $-y = -x + 4$

$y = x - 4$
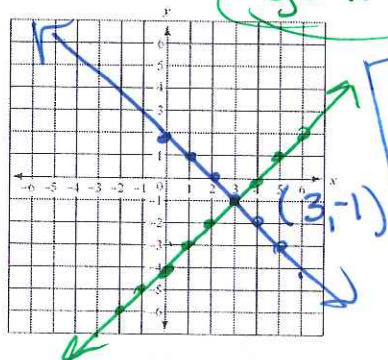
Solution:
$(3, -1)$

$(3, -1)$

b. $y = 2x + 1$

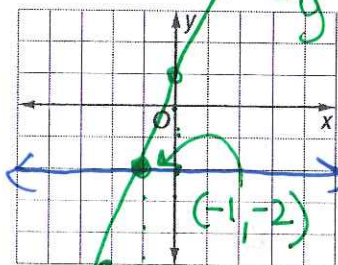$2y = 4x + 2$ → $y = 2x + 1$

Same lines!
Infinitely many solutions

Exercises
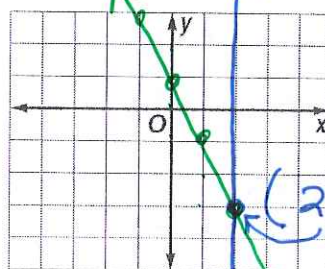
Graph each system and determine the number of solutions it has. If it has one solution, name it.

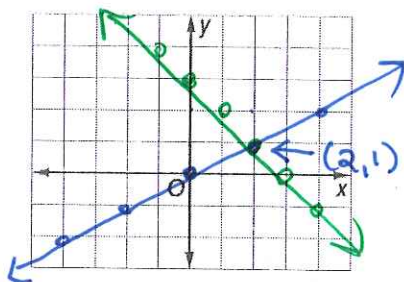1. $y = -2$

$3x - y = -1$ → $-y = -3x - 1$

$y = 3x + 1$

Solution:
$(-1, -2)$

$y = -2$

$(-1, -2)$

2. $x = 2$

$2x + y = 1$ → $y = -2x + 1$

Solution:
$(2, -3)$

$(2, -3)$

3. $y = \frac{1}{2}x$ ← yint = 0!

$x + y = 3$

$y = -x + 3$

Solution:
$(2, 1)$

$(2, 1)$

4. $2y = -4x + 4$ → $y = -2x + 2$

$y = -2x + 2$

same lines!
Infinite solutions