Systems of Equations in Two Variables

Goal: to solve linear systems of two equations and two unknowns by graphing .

ex Is $(2,4)$ a solution to the system

$$\begin{cases} y = 3x - 2 \\ 4x + 3y = 20 \end{cases} ?$$

System

$y = 3x - 2$

$4 = 3(2) - 2$ ✓

$4x + 3y = 20$

$4(2) + 3(4) = 20$

$8 + 12 = 20$ ✓

Yes, (2,4) is a solution.

ex Solve by graphing:

a) $3x + y = 5$

$x - 2y = 4$

$3x + y = 5$

$-3x \quad -3x$

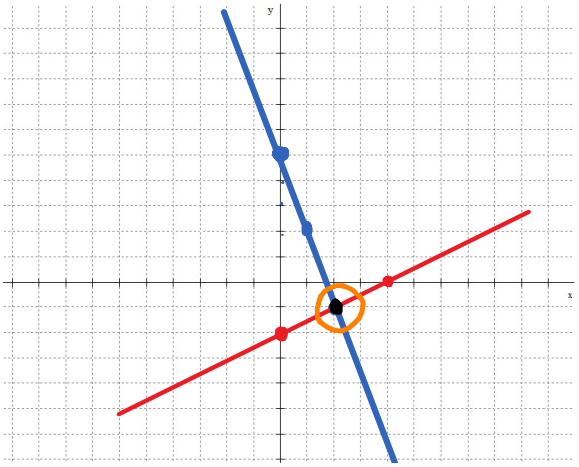
$y = -3x + 5$

$m = \frac{-3}{1}$; rise, run; (0,5)

$x - 2y = 4$

x	y
4	0

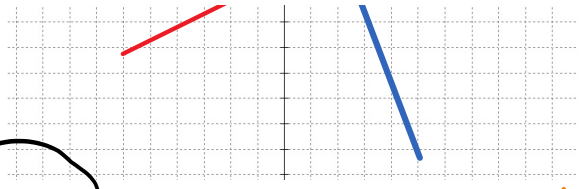
x-int



4	0
0	-2

x-int

y-int



★ (2, -1)

system is consistent and independent

↑ at least one solution

b) $2y - 8x = 10$

$y = 4x + 2$

$2y - 8x = 10$

$+8x \quad +8x$

$\frac{2y}{2} = \frac{8x+10}{2}$

$y = 4x + 5$

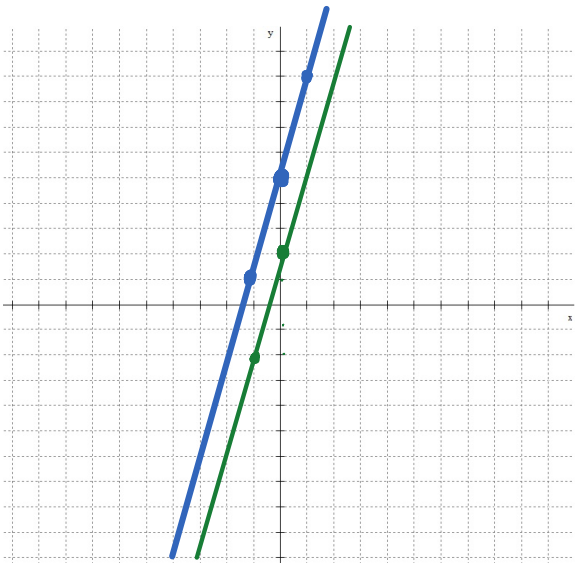
$(0, 5)$

$m = \frac{4}{1}$

$y = 4x + 2$

$(0, 2)$

$m = \frac{4}{1}$



lines are parallel so no solution

↑ we say the system is inconsistent

c) $2x + 3y = 6$

$4x + 6y = 12$

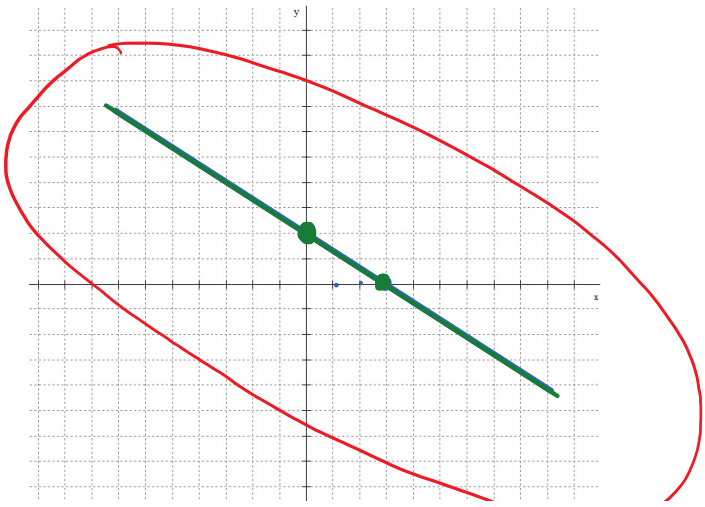
$2x + 3y = 6$

x	y
3	0
0	2

$4x + 6y = 12$

$-4x \quad -4x$

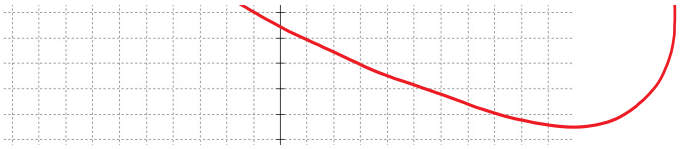
$\frac{6y}{6} = \frac{-4x}{6} + \frac{12}{6}$



$\frac{1}{6}$ $\frac{1}{6}$ $\frac{1}{6}$

$y = -\frac{2}{3}x + 2$

$(0, 2)$ $m = \frac{-2}{3}$



lines coincide, so every pt. is an intersection point! Every pt. is a solution.

$\{(x, y) \mid y = -\frac{2}{3}x + 2\}$ (2 over x, 0 over $+2$)

infinite # of solution

The system is consistent and dependent.