

# Monday, April 8, 2019

When side equals the other

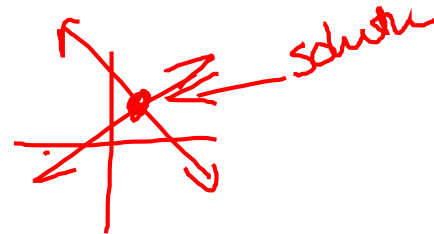
- Warm-up

- Define the "solution" to a system of equations

Where the lines intersect

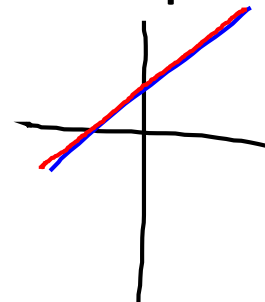
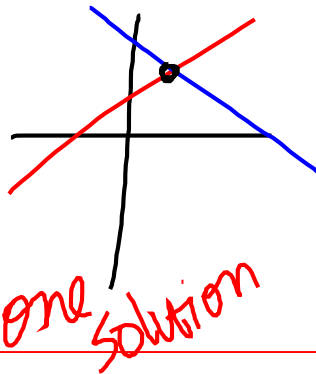
- Give an example of a solution

(2, 3)



Where the x and y are the same

- Systems with linear and nonlinear equations



infinite solutions

## Objectives

**Content:** I will solve systems with both linear and quadratic equations.

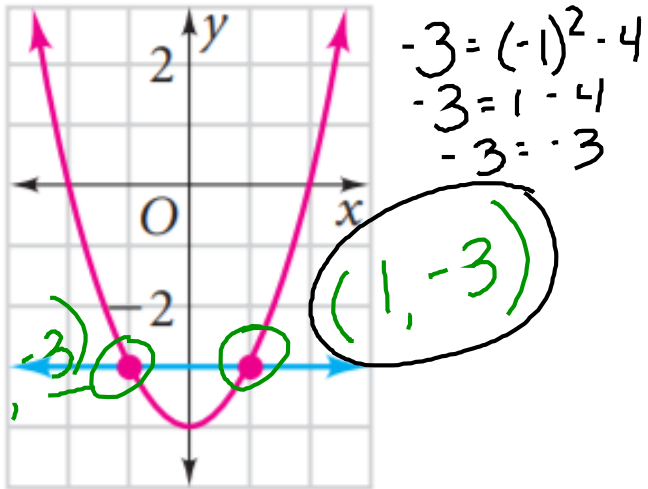
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# Visually – NonLinear Systems

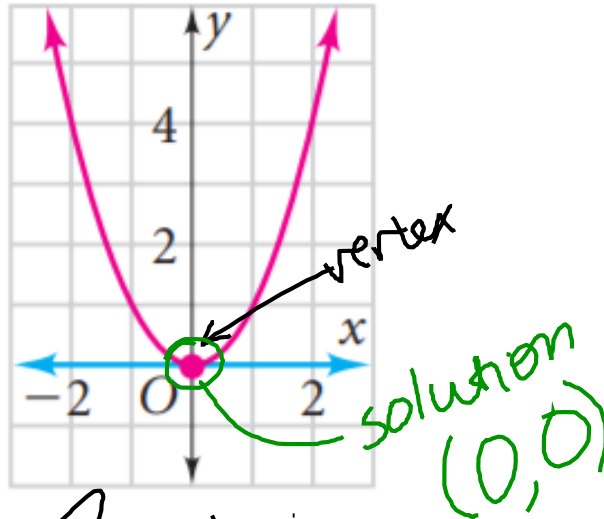
$$y = x^2 - 4$$
$$y = -3$$

$-3 = 1^2 - 4$   
 $-3 = (-1)^2 - 4$   
 $-3 = \cdot 3$   
 $-3 = -3$



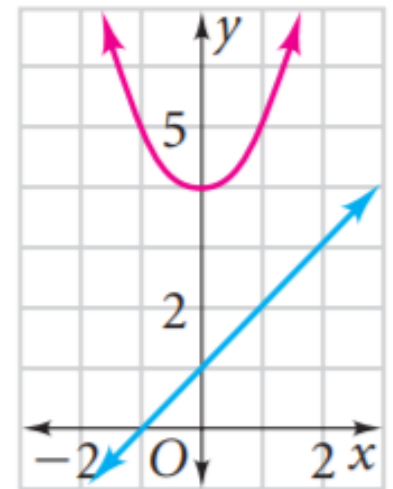
2 solutions

$$y = x^2$$
$$y = 0$$



1 solution

$$y = x^2 + 4$$
$$y = x + 1$$



no solutions

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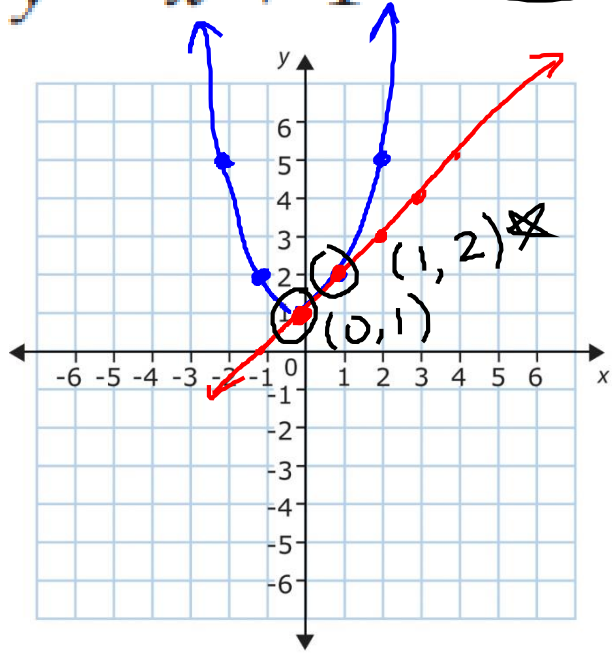
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# Solving systems by graphing

$y = mx + b$   
 $y = x^2 + 1$   
 $y = x + 1$

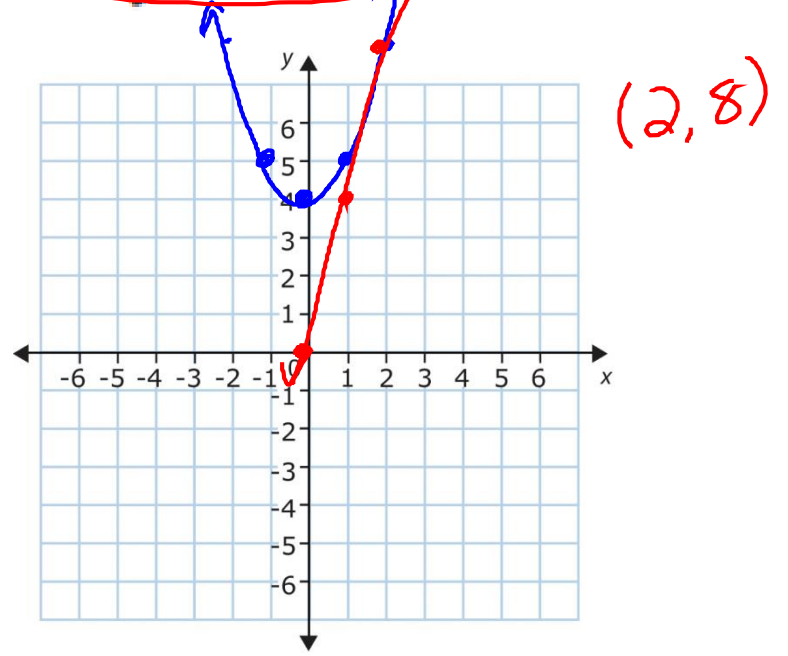
$\rightarrow 2 = 1^2 + 1 \rightarrow 2 = 1 + 1$   
 $2 = 1 + 1$   
 $2 = 2$



x	y
-1	5
0	4
1	5
2	8

$y = x^2 + 4$   
 $y = 4x$

$y = 4x + 0$



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# Brain Break

Quad Formula  

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$y = x^2 + 4$

$y = 4x$

$(2, 8)$

$y = 4(2)$

$y = 8$

$8 = 2^2 + 4$

$8 = 4(2)$

$8 = 4 + 4$

$8 = 8$

$8 = 8$

$4x \left\{ \begin{array}{l} x^2 + 4 \\ -4x \end{array} \right.$

Factor

$0 = x^2 - 4x + 4$

$\begin{array}{cc} +2 & +2 \\ + & + \\ \hline -2 & -2 \\ -1 & -1 \end{array}$

$0 = (x - 2)(x - 2)$

$x - 2 = 0$

$+2 \quad +2$

$x = 2$

$x - 2 = 0$

$+2 \quad -2$

$x = 2$

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# Solving Systems by Substitution

$$y = x^2 + 2x + 4$$

$$y = x + 1$$

$$a = 1$$

$$b = -1$$

$$c = 3$$

$$x = \frac{-(-1) \pm \sqrt{(-1)^2 - 4 \cdot 1 \cdot 3}}{2 \cdot 1}$$

$$= \frac{1 \pm \sqrt{1 - 12}}{2}$$

$$= \frac{1 \pm \sqrt{-11}}{2}$$

no  
real  
solutions

$$\begin{array}{r} x^2 + 2x + 4 \\ -x \quad -1 \\ \hline x^2 - x + 3 \end{array} \begin{array}{l} x+1 \\ -x-1 \\ \hline \end{array}$$

$$x^2 - x + 3 = 0$$

will not factor

No  
Solution

Step 1

equal to  
each other

Step 2

$$= 0$$

(zero a side)

Step 3

solve for x

Step 4

substitute  
to get y

Step 5

check

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# Solving Systems by Substitution

$$\begin{aligned} y &= x^2 - 2x - 6 & (8, 42) \\ y &= 4x + 10 & (-2, 2) \end{aligned}$$

$$\begin{aligned} y &= 5x - 20 \\ y &= x^2 - 5x + 5 & (5, 5) \end{aligned}$$

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# Murder Mystery



$$\begin{aligned}(x+6)^2 &= (x+6)(x+6) \\ &= x^2 + 6x + 6x + 36 \\ &= x^2 + 12x + 36\end{aligned}$$

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# Exit Slip

$$3x + 4y = 12$$

$$4x + 3y = -5$$

What is the value of  $x + y$ , in the system of equations shown above?

	7	7	
.	.	.	.
	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

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