

### 3.5 Solving Nonlinear Systems

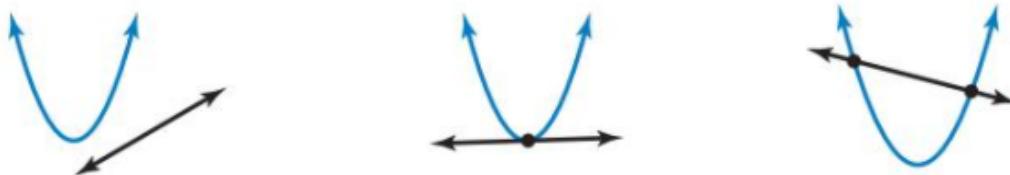
What were some methods of solving systems of linear equations?

With a system of nonlinear equations, at least one of the equations is nonlinear.

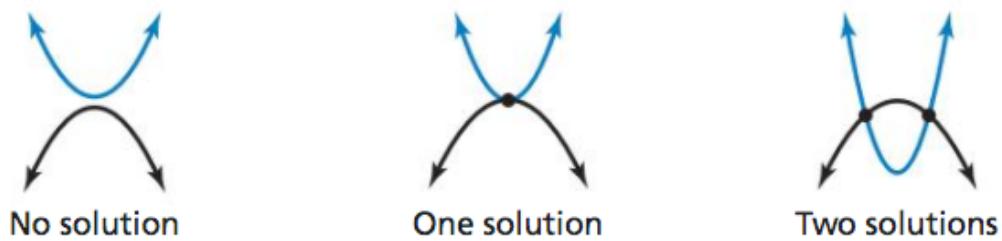
What does it mean for a system of linear equations to have zero solutions, one solution, infinitely many solutions? Explain!

What do you think are types of solutions with a system including a parabola and linear equation?

Ex:



What do you think are types of solutions with a system including 2 parabolas?



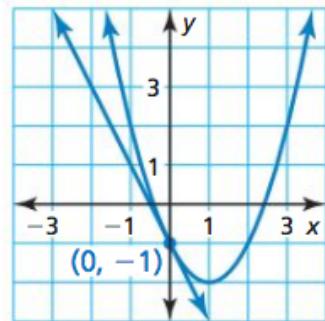
**Example 1:** Solving a nonlinear system by graphing

Solution!

Solve the system by graphing.

$$y = x^2 - 2x - 1$$

$$y = -2x - 1$$

**Example 2:** Solving a nonlinear system by substitution

Solve the system by substitution:

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

$$x + y = 4$$

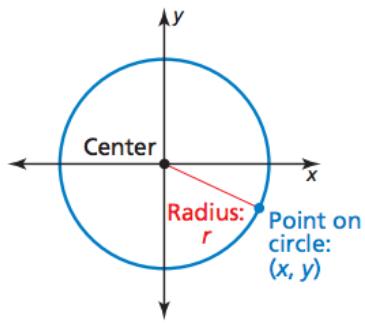
**Example 3:** Solving a nonlinear system by elimination

Solve the system by elimination.

$$2x^2 - 5x - y = -2$$

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

**Spiral Review:** What is the equation of a circle?



**Example 4:** Solve a nonlinear system of equation by substitution

Solve the system by substitution

$$x^2 + y^2 = 10$$

$$y = -3x + 10$$

# Core Concept

## Solving Equations by Graphing

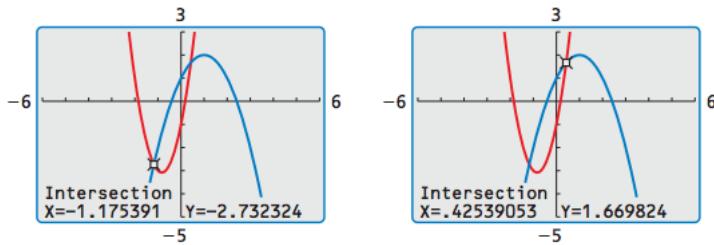
**Step 1** To solve the equation  $f(x) = g(x)$ , write a system of two equations,  $y = f(x)$  and  $y = g(x)$ .

**Step 2** Graph the system of equations  $y = f(x)$  and  $y = g(x)$ . The  $x$ -value of each solution of the system is a solution of the equation  $f(x) = g(x)$ .

**Example 5:** Solving quadratic equations by graphing

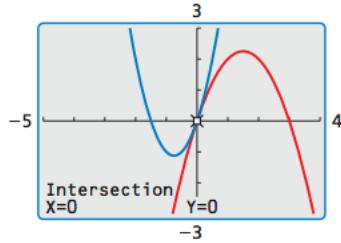
A)  $3x^2 + 5x - 1 = -x^2 + 2x + 1$

### Graphing Solutions for A



B)  $-(x - 1.5)^2 + 2.25 = 2x(x + 1.5)$

### Graphing Solution for B



### Classwork / Homework

3, 7, 8, 11, 15, 17, 23, 27, 34, 42, 43, 50