Solving Systems of Linear and Quadratic Equations
9.5

Remember these?

Systems of Linear Equations

$$2x + y = 8$$

$$x - y = 10$$

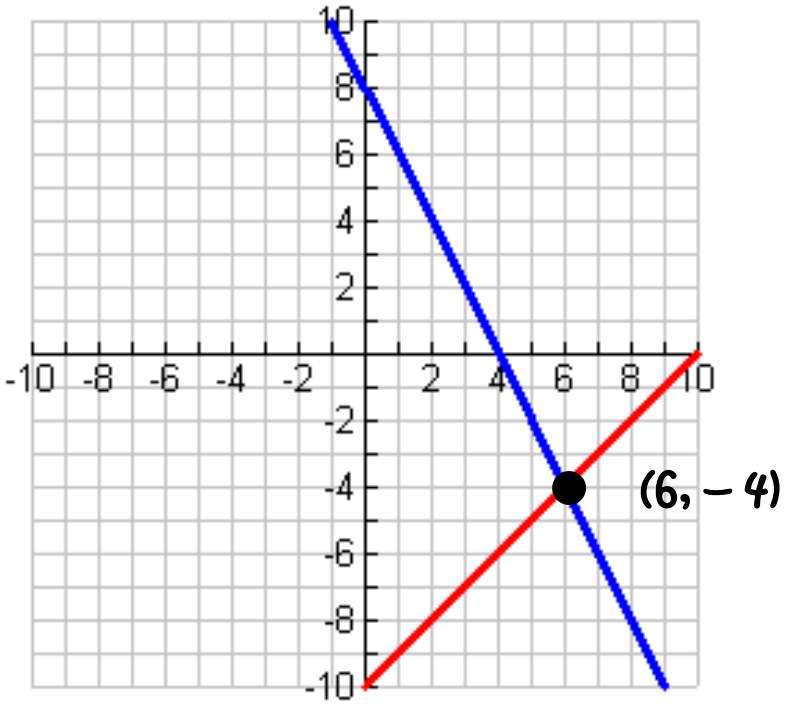
We had 3 methods to solve them.

Method 1 - Graphing

Solve for y.

$$y = -2x + 8$$

$$y = x - 10$$



Remember these?

Systems of Linear Equations

$$2x + y = 8$$

$$x - y = 10$$

Method 2 - Substitution

$$y = -2x + 8$$

$$x - (-y = 10) = 10$$

$$x + 2x - 8 = 10$$

$$3x = 18$$

$$x = 6$$

$$y = -2(2x + 8)$$

$$y = -12 + 8$$

$$y = -4$$

$(6, -4)$

Remember these?

Systems of Linear Equations

$$2x + y = 8$$
$$x - y = 10$$

Method 3 - Elimination

$$\begin{array}{rr} & 2x + y = 8 \\ + & x - y = 10 \\ \hline & 3x = 18 \\ & x = 6 \end{array}$$

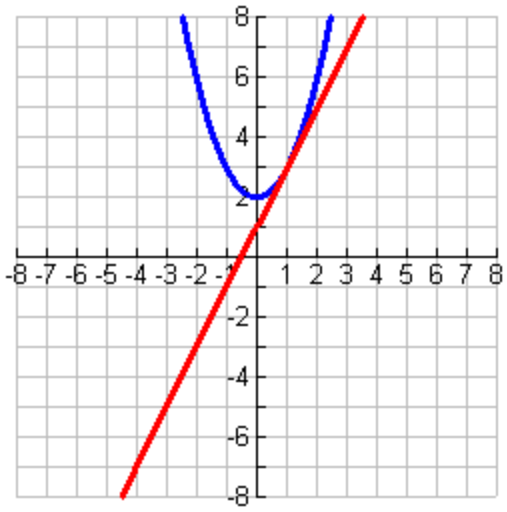
$$\begin{array}{l} (\ x\ ) - y = 10 \\ -y = 4 \\ y = -4 \end{array}$$

(6, – 4)

All 3 methods give us the same answer (6, –4).

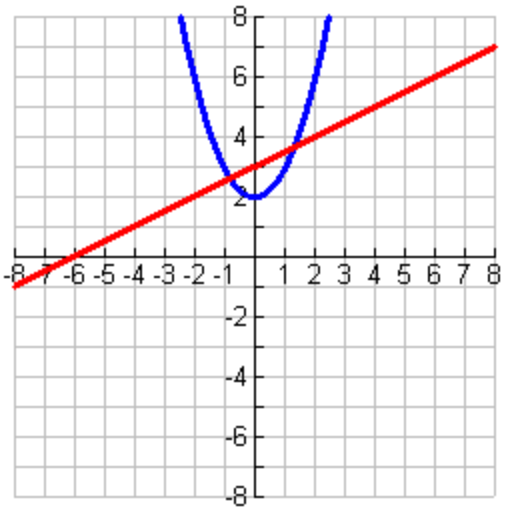
Now let's look at Systems of Linear and Quadratic Equations!

Visualize all of the possible solutions to a Line & a Parabola

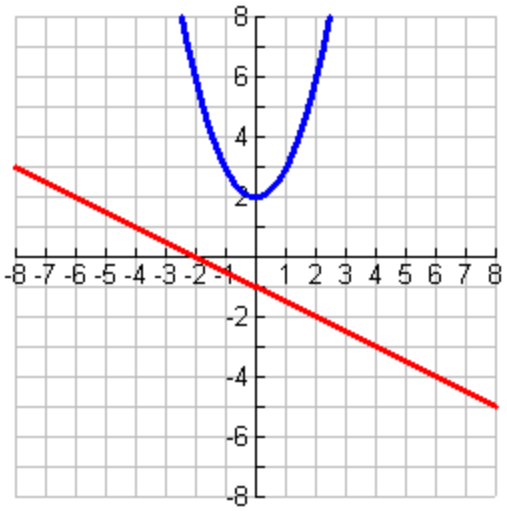


1 solution as an

Ordered pair



2 solutions



No solution

Solve the System Algebraically

Use Substitution

$$y = x^2 + 1$$

$$y - x = 1$$

$$(x^2 + 1) - x = 1$$

$$x^2 - x = 0$$

$$x(x-1) = 0$$

$$x = 0 \quad or \quad x - 1 = 0$$

$$x = 0 \quad or \quad x = 1$$

$\boxed{x = 0}$

$$y = 0^2 + 1$$

$$y = 1$$

(0, 1)

$\boxed{x = 1}$

$$y = 1^2 + 1$$

$$y = 2$$

(1, 2)

Answer: (0,1) (1,2)

Solve the System Algebraically

Use Substitution

$$y = x^2 - 2x + 2$$

$$y - 2x = -2$$

$$y = 2x - 2$$

$$(2x - 2)^2 = x^2 - 2x + 2$$

$$y = 2x - 2$$

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

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

$$0 = x - 2$$

$$x = 2$$

$$\boxed{x = 2}$$

$$y - 2(2) = -2$$

$$y - 4 = -2$$

$$y = 2$$

(2, 2)

Answer: (2,2)

Solve the System Algebraically

Use Elimination

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

$$y = -3x - 8$$

$$\begin{array}{rl} & y = x^2 - 3x - 2 \\ -(& y = \quad -3x - 8) \\ \hline & 0 = x^2 \quad\quad + 6 \\ & -6 = x^2 \end{array}$$

The square of a real number cannot be negative. So, the system has no real solutions.