

Unit 5: Absolute Values, Reciprocals, Systems, Inequalities

5.5 Solving Systems Algebraically

In Math 10C, we learned two algebraic methods to solve systems: elimination and substitution.

- Substitution Steps:**
- 1) Isolate one variable.
 - 2) Substitute into the other equation.
 - 3) Solve.

- Elimination Steps:**
- 1) Align both equations and multiply one equation so you have a zero pair.
 - 2) Add vertically (one variable should eliminate).
 - 3) Solve.

**** Remember: "Solving" means something different when solving a linear equation and a quadratic equation.****



Ex.) Solve by substitution.

$$\begin{aligned} 3x + y &= 9 \\ 4x^2 + x - y &= -9 \end{aligned}$$

$y = (-3x + 9)$

$$4x^2 + x - (-3x + 9) = -9$$

$$4x^2 + 4x - 9 = -9$$

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

$$4x(x + 1) = 0$$


$x = 0, -1$

$y = -3(0) + 9$
 $y = 9$

$y = -3(-1) + 9$
 $y = 12$

$(0, 9)$
 $(-1, 12)$

* final answer always an ordered pair



Ex.) Solve by elimination.

y-values

$$\begin{array}{r}
 3x + y = 9 \\
 + \quad 4x^2 + x \quad y = -9 \\
 \hline
 4x^2 + 4x = 0
 \end{array}$$

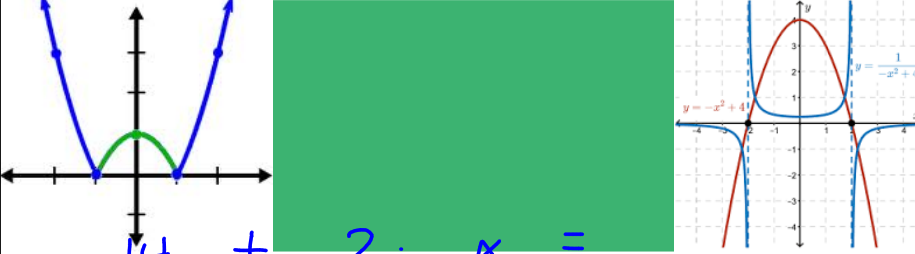
zeropair

$$4x(x+1) = 0$$

$$x = 0, -1$$

$(0, 9)$
 $(-1, 12)$

$3(0) + y = 9$
 $y = 9$
 $3(-1) + y = 9$
 $y = 12$



Ex.) Fourteen more than twice the first integer is the second integer. The second integer increased by one is the square of the first integer. Algebraically determine the values of the two integers.

$x =$ first integer
 $y =$ 2nd integer

$$(14 + 2x) = y$$

$$y + 1 = x^2$$

$$(14 + 2x) + 1 = x^2$$

$$0 = x^2 - 2x - 15$$

$$0 = (x - 5)(x + 3)$$

$$x = 5, -3$$

$(5, 24)$
 $(-3, 8)$

$y = 14 + 2x$
 $y = 14 + 2(5)$
 $y = 24$
 $y = 14 + 2(-3)$
 $y = 8$



Ex.) A crate with a parachute is dropped from an airplane. The crates height above the ground is given by:

$h = -4.9t^2 + 900$
 $h = -4t + 500$

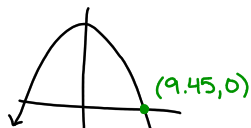
How long does it take for the parachute to open, to the nearest hundredth of a second? What is the height above the ground when the parachute opens?

$$\begin{array}{r}
 h = -4.9t^2 + 900 \\
 -h = 0t^2 + 4t - 500 \\
 \hline
 0 = -4.9t^2 + 4t + 400
 \end{array}$$

Window

x: $[-10, 10]$

y: $[-10, 400]$



Pg. 45)

#1-4, 9, 10.

- 9.45 s for the parachute to open
- parachute opens at 462m