

Notes:

# Solving Systems of Equations by Substitution

Created for you by Ms. Nhotsoubarh

### Steps:

- 1.) Pick one of the equations and solve for one of the variables. (You want to isolate a variable by itself)
- 2.) Substitute the expression you just found in step 1 for that variable in the other equation and solve for the variable.
- 3.) Substitute the value for that variable into either equation to solve for the other variable.
- 4.) Write your answer as an ordered pair.

**EXAMPLE 1:** Solve the system of equations.

$$y = 3x - 5$$

$$8x + y = -16$$

$$8x + (3x - 5) = -16$$

$$8x + 3x - 5 = -16$$

$$11x - 5 = -16$$

$$\begin{array}{r} 11x - 5 = -16 \\ +5 \quad +5 \\ \hline \end{array}$$

$$\frac{11x}{11} = \frac{-11}{11}$$

$$x = -1$$

$$y = 3x - 5$$

$$y = 3(-1) - 5$$

$$y = -3 - 5$$

$$y = -8$$

ANSWER:  
(-1, -8)

Name: Key

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Glue on page 3

HW: Systems of Equations by Substitution Worksheet #s 1-13 (odds) use pages 4 - 6

**EXAMPLE 2:** Solve the system of equations.

$$y = -3x + 17$$

$$4x - y = 18$$

$$4x - (-3x + 17) = 18$$

$$4x + 3x - 17 = 18$$

$$7x - 17 = 18$$

$$7x + 17$$

$$7x = \frac{35}{7}$$

$$x = 5$$

$$y = -3(5) + 17$$

$$y = -15 + 17$$

$$y = 2$$

$$y = 2$$

Point of intersection  
 $(x, y)$   
 $(5, 2)$

**YOUR TURN 4:** Solve the system of equations.

$$y = -4x + 2$$

$$y = 6x - 8$$

$$-4x + 2 = 6x - 8$$

$$+4x$$

$$2 = 10x - 8$$

$$+8$$

$$\frac{10}{10} = \frac{10x}{10}$$

$$x = 1$$

$$y = 6x - 8$$

$$y = 6(1) - 8$$

$$y = 6 - 8$$

$$y = -2$$

Solution  
 $(x, y)$   
 $(1, -2)$

**EXAMPLE 3:** Solve the system of equations.

$$x + y = 4 \rightarrow \text{get a variable by itself} \dots y = -x + 4$$

$$2x + 2y = 7$$

$$2x + 2(-x + 4) = 7$$

$$2x - 2x + 8 = 7$$

$$8 \neq 7$$

no solution

3 cases

• 1 solution

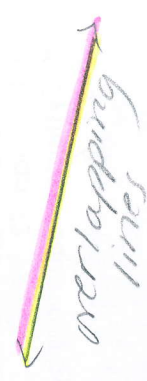


• no solution



no intersection

• infinite solutions



**YOUR TURN 5:** Solve the system of equations.

$$-4x - 6y = -16$$

$$y = x - 4$$

$$-4x - 6(x - 4) = -16$$

$$-4x - 6x + 24 = -16$$

$$-10x + 24 = -16$$

$$-2x - 24$$

$$\frac{-10x}{-10} = \frac{-40}{-10}$$

$$x = 4$$

$$y = x - 4$$

$$y = 4 - 4$$

$$y = 0$$

$$x = 4$$

$(x, y)$

$(4, 0)$

Solution / Point of intersection