8-10 (Day 2): Solving Systems of Equations by Substitution

1-28-16

Remember:

To solve systems of equations:

1) Graphing - intersection of lines (solution → ordered pair)
2) Substitution - substitute value of one variable into the other equation
3) Elimination - eliminate one of the variables

Possible Solutions:

1) One solution (ordered pair)
2) Infinitely many solutions (same line)
3) No solution (parallel lines - do not intersect)

Ex. 1: Solve by using substitution. * Solve one equation for x or y, then substitute into other equation.

A)
$y = x - 4$
$y = 2x - 9$

* both equations are solved for y; we can set them equal to each other

$x - 4 = 2x - 9$
$-2x \quad -2x$
$-x - 4 = -9$
$+4 \quad +4$
$-1(-x = -5)$
$x = 5$

plug into either equation to solve
$y = x - 4$
$y = (5) - 4$
$y = 1$

$\boxed{(5, 1)}$

B)
$x + 2y = 8$
$x - 3y = 13$
$+3y \quad +3y$
$x = (3y + 13)$

$(3y + 13) + 2y = 8$
$5y + 13 = 8$
$-13 \quad -13$
$\frac{5y}{5} = \frac{-5}{5}$
$y = -1$

$x = 3(-1) + 13$
$x = -3 + 13$
$x = 10$

$\boxed{(10, -1)}$

C)
$8x + 2(y) = 13$
$4x + y = 1 \Rightarrow y = (-4x + 1)$
$8x + 2(-4x + 1) = 13$
$8x - 8x + 2 = 13$
$2 \neq 13$

$\boxed{\text{No Solution}}$

* If the variables go away and the remaining numbers are not equal, the answer is no solution!

D)
$10x - 2(y) = 20$
$y + 10 = 5x \Rightarrow y = (5x - 10)$
$10x - 2(5x - 10) = 20$
$10x - 10x + 20 = 20$
$20 = 20$

$\boxed{\text{Infinitely Many Solutions}}$

* If the variables go away and the remaining numbers are equal, the answer is infinitely many solutions!