Example 1:

$2x + 3y = 6$

$x + 4y = 13 \Rightarrow x = -4y + 13$

$2x + 3y = 6$

$2(-4y + 13) + 3y = 6$

$-8y + 26 + 3y = 6$

$-5y + 26 = 6$

$-5y = -20$

$y = 4$

$x = -4(4) + 13$

$x = -16 + 13$

$x = -3$

$(-3, 4)$ is the solution

## Watch Substitution Video

http://www.shmoop.com/video/solvi
systems-of-equations-by-substitutio

Example 2:

$y - 5 = -3x \Rightarrow y = -3x + 5$

$7x + 3y = 7$

$7x + 3y = 7$

$7x + 3(-3x + 5) = 7$

$7x - 9x + 15 = 7$

$-2x + 15 = 7$

$-2x = -8$

$x = 4$

$y = -3(4) + 5$

$y = -12 + 5$

$y = -7$

$(4, -7)$ is the solution

# Example 3:

## Solve by Substitution:

$4x + 5y = 10$

$2x - 3y = 4 \Rightarrow 2x = 3y + 4 \Rightarrow x = \frac{3}{2}y + 2$

$4x + 5y = 10$

$4\left(\frac{3}{2}y + 2\right) + 5y = 10$

$6y + 8 + 5y = 10$

$11y + 8 = 10$

$11y = 2$

$y = \frac{2}{11}$

$x = \frac{3}{2}\left(\frac{2}{11}\right) + 2$

$x = \frac{3}{11} + 2$

$x = 2\frac{3}{11}$

$x = \frac{25}{11}$

$\left(\frac{25}{11}, \frac{2}{11}\right)$ is the solution

Which methods are correct using substitution?

A. $2x + y = 4$
$-x + y = 1$

$y = -2x + 4$
$-x + (-2x + 4) = 1$

yes

B. $2x + y = 4$
$-x + y = 1$

$y = x + 1$
$2x + (x + 1) = 4$

yes

C. $2x + y = 4$
$-x + y = 1$

$-x = -y + 1$
$-1(-x = -y + 1)$
$x = y - 1$
$2(y - 1) + y = 4$

yes

# You Try!

## Example 4:

**-2y + x = -19** $\Rightarrow$ $x = 2y - 19$

**5x + 2y = 1**

$5x + 2y = 1$

$5(2y - 19) + 2y = 1$

$10y - 95 + 2y = 1$

$12y - 95 = 1$

$12y = 96$

$y = 8$

$x = 2(8) - 19$

$x = 16 - 19$

$x = -3$

$(-3, 8)$ is the solution