Solving Linear Systems by Substitution Notes

Creating an Equation in One Variable Using Substitution

Circle the expression and the variable that you can substitute in for the system of equations.	Circle the expression and the variable that you can substitute in for the system of equations.
① $x = (y - 3)$ $10x + 6y = 2$	$y = (5x - 9)$ $x - y = 5$

Solving a System of Equations Using Substitution

Step 1: Circle the expression and the variable that you can substitute in for the system of equations.	① $10(y-3) + 6y = 2$ $10y - 30 + 6y = 2$
Step 2: Substitute the expression in for the variable in the other equation.	$16y - 30 = 2$ $+30 \quad +30$
Step 3: Simplify and solve for the remaining variable.	$\frac{16y}{16} = \frac{32}{16}$ $y = 2$
Step 4: Substitute your solution into one of the two original equations in order to solve for the other variable.	$x = 2 - 3$ $x = -1$
Step 5: Write your solution as an ordered pair.	$(-1, 2)$
Step 6: Substitute your values for x and y into both equations to make sure that they make the equations true.	$x = y - 3$ $-1 = 2 - 3$ $-1 = -1$ ✓ $10x + 6y = 2$ $10(-1) + 6(2) = 2$ $-10 + 12 = 2$ $2 = 2$ ✓

Solve the following linear systems using substitution. Check your solution.

1) $y = 5x - 9$
$x - y = 5$

$x - 1(5x - 9) = 5$
$x - 5x + 9 = 5$
$-4x + 9 = 5$
$-9 \quad -9$
$-4x = -4$
$\frac{-4x}{-4} = \frac{-4}{-4}$
$x = 1$

$y = 5(1) - 9$
$y = 5 - 9$
$y = -4$

$(1, -4)$

$y = 5x - 9$
$-4 = 5(1) - 9$
$-4 = 5 - 9$
$-4 = -4$ ✓

$x - y = 5$
$1 - (-4) = 5$
$5 = 5$ ✓

2) $-7x - 2y = -13$
$x - 2y = 11$
$+2y \quad +2y$
$x = 2y + 11$

$-7(2y + 11) - 2y = -13$
$-14y - 77 - 2y = -13$
$-16y - 77 = -13$
$+77 \quad +77$
$-16y = 64$
$\frac{-16y}{-16} = \frac{64}{-16}$
$y = -4$

$x = 2(-4) + 11$
$x = -8 + 11$
$x = 3$

$(3, -4)$

3) $-5x + y = -2$
$-3x + 6y = -12$

$-5x + y = -2$
$+5x \quad +5x$
$y = 5x - 2$

$-3x + 6(5x - 2) = -12$
$-3x + 30x - 12 = -12$
$27x - 12 = -12$
$+12 \quad +12$
$27x = 0$
$\frac{27x}{27} = \frac{0}{27}$
$x = 0$

$y = 5(0) - 2$
$y = 0 - 2$
$y = -2$

$(0, -2)$