Solving Linear Systems Using Substitution

The Substitution Method

STEP 1 **Solve** one of the equations for one of its variables.

STEP 2 **Substitute** the expression from Step 1 into the other equation and solve for the other variable.

STEP 3 **Substitute** the value from Step 2 into the revised equation from Step 1 and solve.

$$\begin{cases} y = x - 6 \\ 3x + 4y = 4 \end{cases}$$

$3x + 4(x - 6) = 4$

$3x + 4x - 24 = 4$

$7x = 28$

$x = 4$

$y = x - 6$

$y = 4 - 6$

$y = -2$

$(4, -2)$

Example 2:

$$\begin{cases} y = x + 2 \\ 3x - y = 2 \end{cases}$$

$y = x + 2$

$y = 2 + 2$

$y = 4$

$3x - (x + 2) = 2$

$3x - x - 2 = 2$

$2x = 4$

$x = 2$

$(2, 4)$

Example 3:

$4c + 5d = 11$

$3c - d = 13$

$+d \quad +d$

$3c = 13 + d$

$-13 \quad -13$

$3c - 13 = d$

$4c + 5(3c - 13) = 11$

$4c + 15c - 65 = 11$

$19c = 76$

$c = 4$

$3(4) - 13 = d$

$12 - 13 = d$

$-1 = d$

$(4, -1)$