

## 3.2 Solve Linear Systems Algebraically

### EXAMPLE 1 Use the substitution method

Solve the system using the substitution method.

$$\begin{aligned}2x + 5y &= -5 \\ x + 3y &= 3\end{aligned}$$

Handwritten solution steps:

$$x = -3y + 3$$
$$2(-3y + 3) + 5y = -5$$
$$-6y + 6 + 5y = -5$$
$$-y + 6 = -5$$
$$-y = -11$$
$$y = 11$$
$$x = -3(11) + 3$$
$$x = -30$$

The solution is boxed as  $(30, 11)$ .

**EXAMPLE 2**

Solve the system using the substitution method.

$$\begin{aligned}4x + 3y &= -2 \\x + 5y &= -9\end{aligned}$$

$x = -5y - 9$

$$4(-5y - 9) + 3y = -2$$
$$-20y - 36 + 3y = -2$$
$$-17y - 36 = -2$$
$$-17y = 34$$

$y = -2$

$$x = -5(-2) - 9$$

$x = 1$

$(1, -2)$

**EXAMPLE 3**

Solve the linear system.

$$x - 2y = 4$$

$$3x - 6y = 8$$

$$x = 2y + 4$$

$$3(2y + 4) - 6y = 8$$

$$6y + 12 - 6y = 8$$

$$~~12 = 8~~$$

no solution

55. **GUITAR SALES** In one week, a music store sold 9 guitars for a total of \$3611. Electric guitars sold for \$479 each and acoustic guitars sold for \$339 each. How many of each type of guitar were sold?

$e \rightarrow$  electric  
 $a \rightarrow$  acoustic

$$3611 = 479e + 339a$$

$$9 = e + a$$

$$a = 9 - e$$

$$3611 = 479e + 339(9 - e)$$

$$3611 = 479e + 3051 - 339e$$

$$3611 = 140e + 3051$$

$$560 = 140e$$

$$e = \frac{560}{140} = \frac{56}{14} = 4$$

4 electric  
 5 acoustic

$$\begin{array}{r} 339 \\ 1 \cdot 9 \\ \hline 2700 \\ 270 \\ 81 \\ \hline 3051 \end{array}$$