3.2 Solve Linear Systems Algebraically

EXAMPLE 1

Solve the system using the elimination method.

$$2x + 5y = -5$$
$$-2(x + 3y = 3)$$

$$x + 3(11) = 3$$
$$x + 33 = 3$$
$$x = -30$$

$$(-30, 11)$$

$$2x + 5y = -5$$
$$-2x - 6y = -6$$
$$\overline{}$$
$$-y = -11$$
$$y = 11$$

EXAMPLE 2   **Use the elimination method**

Solve the system using the elimination method.

$-2\left(\begin{array}{l} 3x - 7y = 10 \\ 6x - 8y = 8 \end{array} \right.$

$-6x + 14y = -20$
$6x - 8y = 8$

$6y = -12$
$\dfrac{6y}{6} = \dfrac{-12}{6}$
$y = -2$

$6x - 8(-2) = 8$

$6x + 16 = 8$

$\dfrac{6x}{6} = \dfrac{-8}{6}$

$x = \dfrac{-4}{3}$

$\left(\dfrac{-4}{3}, -2 \right)$

Solve the system using the substitution or the elimination method.

$$4\,(3x - 6y = 9)$$
$$3\,(-4x + 7y = -16)$$

$$12x - 24y = 36$$
$$-12x + 21y = -48$$

$$-3y = -12$$
$$\frac{-3}{-3} = \frac{-12}{-3}$$
$$y = 4$$

$$3x - 6(4) = 9$$
$$3x - 24 = 9$$
$$\frac{3x}{3} = \frac{33}{3}$$
$$x = 11$$

$$\boxed{(11, 4)}$$

EXAMPLE 4

Solve the linear system.

$$7\,(\,4x - 10y = 8\,)$$
$$2\,(\,-14x + 35y = -28\,)$$

$$28x - 70y = 56$$
$$-28x + 70y = -56$$

$$0 = 0$$

Infinitely many

SOLVING LINEAR SYSTEMS Solve the system using any algebraic method.

45. $0.05x - 0.03y = 0.21$

$0.07x + 0.02y = 0.16$

$2(5x - 3y = 21)$

$3(7x + 2y = 16)$

$\dfrac{5}{1}\left(\dfrac{90}{31}\right) - 3y = 21$

$\dfrac{450}{31} - 3y = 21$

$-3y = 21 \cdot \dfrac{31}{31} - \dfrac{450}{31}$

$-3y = \dfrac{651}{31} - \dfrac{450}{31}$

$\dfrac{-3y}{-3} = \dfrac{\frac{201}{31}}{-3}$

$y = \dfrac{201}{31 \cdot -3}$

$\dfrac{67}{-31}$

$10x - 6y = 42$

$21x + 6y = 48$

$\dfrac{31x}{31} = \dfrac{90}{31}$

$x = \dfrac{90}{31}$

$y = -\dfrac{67}{31}$

$\left(\dfrac{90}{31}, \dfrac{-67}{31}\right)$