

MORE PRACTICE: Cramer's Rule

Use Cramer's Rule to solve each system of equations.

1.  $4x - y = 1$   
 $2x + 3y = 11$

$$X = \frac{\begin{vmatrix} 1 & -1 \\ 11 & 3 \end{vmatrix}}{\begin{vmatrix} 4 & -1 \\ 2 & 3 \end{vmatrix}} = \frac{3+11}{12+2} = \frac{14}{14} = 1$$

$$Y = \frac{\begin{vmatrix} 4 & 1 \\ 2 & 11 \end{vmatrix}}{\begin{vmatrix} 4 & -1 \\ 2 & 3 \end{vmatrix}} = \frac{44-2}{14} = \frac{42}{14} = 3$$

$(1, 3)$

2.  $x - y = 3$   
 $2x + y = 12$

$$X = \frac{\begin{vmatrix} 3 & -1 \\ 12 & 1 \end{vmatrix}}{\begin{vmatrix} 1 & -1 \\ 2 & 1 \end{vmatrix}} = \frac{3+12}{1+2} = \frac{15}{3} = 5$$

$$Y = \frac{\begin{vmatrix} 1 & 3 \\ 2 & 12 \end{vmatrix}}{\begin{vmatrix} 1 & -1 \\ 2 & 1 \end{vmatrix}} = \frac{12-6}{3} = \frac{6}{3} = 2$$

$(5, 2)$

3.  $-x + 4y = 5$   
 $2x - 3y = 0$

$$X = \frac{\begin{vmatrix} 5 & 4 \\ 0 & -3 \end{vmatrix}}{\begin{vmatrix} -1 & 4 \\ 2 & -3 \end{vmatrix}} = \frac{-15-0}{3-8} = \frac{-15}{-5} = 3$$

$$Y = \frac{\begin{vmatrix} -1 & 5 \\ 2 & 0 \end{vmatrix}}{\begin{vmatrix} -1 & 4 \\ 2 & -3 \end{vmatrix}} = \frac{0-10}{-5} = \frac{-10}{-5} = -2$$

$(3, -2)$

4.  $x + 5y = 8$   
 $-4x + 5y = -7$

$$X = \frac{\begin{vmatrix} 8 & 5 \\ -7 & 5 \end{vmatrix}}{\begin{vmatrix} 1 & 5 \\ -4 & 5 \end{vmatrix}} = \frac{40+35}{5+20} = \frac{75}{25} = 3$$

$$Y = \frac{\begin{vmatrix} 1 & 8 \\ -4 & -7 \end{vmatrix}}{25} = \frac{-7+32}{25} = \frac{25}{25} = 1$$

$(3, 1)$

5.  $3x + 4y = 10$   
 $2x + 5y = 9$

$$X = \frac{\begin{vmatrix} 10 & 4 \\ 9 & 5 \end{vmatrix}}{\begin{vmatrix} 3 & 4 \\ 2 & 5 \end{vmatrix}} = \frac{50-36}{15-8} = \frac{14}{7} = 2$$

$$Y = \frac{\begin{vmatrix} 3 & 10 \\ 2 & 9 \end{vmatrix}}{7} = \frac{27-20}{7} = \frac{7}{7} = 1$$

$(2, 1)$

6.  $y = x + 1$   
 $2y = -x - 10$

$$\begin{aligned} -x + y &= 1 \\ x + 2y &= -10 \end{aligned}$$

$$X = \frac{\begin{vmatrix} 1 & 1 \\ -10 & 2 \end{vmatrix}}{\begin{vmatrix} -1 & 1 \\ 1 & 2 \end{vmatrix}} = \frac{2+10}{-2-1} = \frac{12}{-3} = -4$$

$$Y = \frac{\begin{vmatrix} -1 & 1 \\ 1 & -10 \end{vmatrix}}{-3} = \frac{10-1}{-3} = \frac{9}{-3} = -3$$

$(-4, -3)$