

8.3 Practice Problems

Find the value of the determinant.

$$1. \begin{vmatrix} 1 & -2 \\ -5 & 7 \end{vmatrix}$$

$$= 1(7) - (-5)(-2)$$

$$= 7 - 10$$

$$= -3$$

$$2. \begin{vmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{vmatrix}$$

$$1 \begin{vmatrix} 5 & 6 \\ 8 & 9 \end{vmatrix} - 2 \begin{vmatrix} 4 & 6 \\ 7 & 9 \end{vmatrix} + 3 \begin{vmatrix} 4 & 5 \\ 7 & 8 \end{vmatrix}$$

$$1(5 \cdot 9 - 8 \cdot 6) - 2(4 \cdot 9 - 7 \cdot 6) + 3(4 \cdot 8 - 7 \cdot 5)$$

$$1(45 - 48) - 2(36 - 42) + 3(32 - 35)$$

$$1(-3) - 2(-6) + 3(-3)$$

$$-3 + 12 - 9 = 0$$

3. Use Cramer's rule to solve the system of equations.

$$\begin{cases} 2x + 3y = 8 \\ 3x + 4y = -5 \end{cases}$$

$$D = \begin{vmatrix} 2 & 3 \\ 3 & 4 \end{vmatrix} = 8 - 9 = -1$$

$$D_x = \begin{vmatrix} 8 & 3 \\ -5 & 4 \end{vmatrix} = 32 + 15 = 47$$

$$D_y = \begin{vmatrix} 2 & 8 \\ 3 & -5 \end{vmatrix} = -10 - 24 = -34$$

$$x = \frac{D_x}{D} = \frac{47}{-1} = -47$$

$$y = \frac{D_y}{D} = \frac{-34}{-1} = 34$$

Solution
(-47, 34)

$$\text{Check: } 2(-47) + 3(34) = 8$$

$$-94 + 102 = 8$$

$$8 = 8$$

$$3(-47) + 4(34) = -5$$

$$-141 + 136 = -5$$

$$-5 = -5$$

4. Solve for x

$$\begin{vmatrix} x & -4 \\ -x & 3 \end{vmatrix} = 5$$

$$3x - 4x = 5$$

$$-x = 5$$

$$x = -5$$