

## Lesson 6-8

## Example 1

Determine whether the given ordered pair is a solution to the given systems of inequalities.

a.  $(2, 0)$ ;  $x + y < 4$   
 $2x - y \leq 4$

b.  $(-1, 3)$ ;  $2x + y \geq 4$   
 $3x - 3y \leq -2$

c.  $(2, 1)$ ;  $x + y \leq -2$   
 $x - 2y > 1$

## Solution

Substitute for  $x$  and  $y$  in each system of inequalities.

a.  $x = 2, y = 0$

$$\begin{aligned} x + y &< 4 \\ 2 + 0 &< 4 \text{ True} \end{aligned}$$

$$\begin{aligned} 2x - y &\leq 4 \\ 4 - 0 &\leq 4 \text{ True} \end{aligned}$$

The point is a solution for both inequalities. Therefore,  $(2, 0)$  is a solution for this system.

b.  $x = -1, y = 3$

$$\begin{aligned} 2x + y &\geq 4 \\ -2 + 3 &\geq 4 \text{ False} \end{aligned}$$

$$\begin{aligned} 3x - 3y &\leq -2 \\ -3 - 9 &\leq -2 \text{ True} \end{aligned}$$

The point is a solution for only one of the inequalities. Therefore,  $(-1, 3)$  is not a solution for this system.

c.  $x = 2, y = 1$

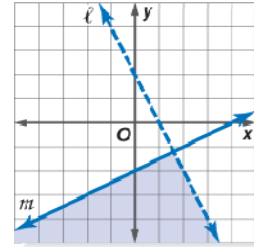
$$\begin{aligned} x + y &\leq -2 \\ 2 + 1 &\leq -2 \text{ False} \end{aligned}$$

$$\begin{aligned} x - 2y &> 1 \\ 2 - 2 &> 1 \text{ False} \end{aligned}$$

The point is not a solution for either inequality. Therefore,  $(2, 1)$  is not a solution for this system.

**Example 2**

Write a system of linear inequalities for the graph at the right.

**Solution**

1. Determine the equation of each line	2. Determine shading.	3. Determine inequality symbol.	4. Inequality
line $l$ : $b = 2, m = -2$ $y = -2x + 2$	below the line	$<$	$y < -2x + 2$
line $m$ : $b = -2, m = \frac{1}{2}$ $y = \frac{1}{2}x - 2$	below and including the line	$\leq$	$y \leq \frac{1}{2}x - 2$

The system of linear inequalities for the graph is

$$y < -2x + 2$$

$$y \leq \frac{1}{2}x - 2$$

**Example 3**

**MANUFACTURING** A company writes a system of inequalities, shown below, to analyze how changes in plastic and paper affect a product's cost. Graph the solution set of the system.

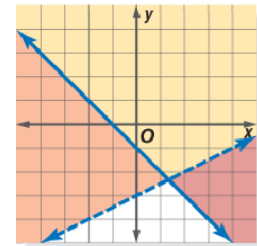
$$2y - x > -6 \qquad y + x \geq -1$$

**Solution**

Graph each inequality by graphing the equation of each line. Write each inequality in slope-intercept form. Then make a chart to use for graphing.

$$\begin{aligned} 2y - x &> -6 \\ 2y &> x - 6 \\ y &> \frac{1}{2}x - 3 \end{aligned}$$

$$\begin{aligned} y + x &\geq -1 \\ y &\geq -x - 1 \end{aligned}$$



The solution set consists of all the points in the region that has been doubly shaded. The solution includes points on the solid boundary line  $y \geq -x - 1$ , but not on the dashed boundary line  $y > \frac{1}{2}x - 3$ .