### Graphical Solutions of Systems of Linear Inequalities in Two Variables

An ordered pair (x,y) is a **solution** to a system of inequalities if it satisfies all the inequalities in the system.

Graphically, the coordinates of a point that lie on the graphs of all inequalities in the system is part of its solution.

To solve a system of inequalities in two variables by graphing:

- Draw the graph of each inequality on the same coordinate plane.
   Shade the appropriate half-plane.
- The region where shaded areas overlap is the graphical solution to the system. If the graphs do not overlap, then the system has no solution.

### **Practice Exercises**

A. Identify whether each ordered pair is a solution to the given system of linear inequality. Write *YES* if it is or *NO* if it is not.

1. 
$$\begin{cases} 5x+y > 3 \\ y \le x-4 \end{cases}$$
2. 
$$\begin{cases} 2x+5y \\ 3x-4y \end{cases}$$
a.  $(-1, 2)$ 
b.  $(0, 0)$ 
c.  $(-3, 2)$ 
2. 
$$\begin{cases} 2x+5y \\ 3x-6y \end{cases}$$
c.  $(-3, 2)$ 
2. 
$$\begin{cases} 2x+5y \\ 3x-6y \end{cases}$$
c.  $(-3, 2)$ 
3. 
$$\begin{cases} 2x+5y \\ 3x-6y \end{cases}$$
5. 
$$\begin{cases} 2x+5y \\ 3x-6y \end{cases}$$
6. 
$$\begin{cases} 2x+5y \\ 3x-6y \end{cases}$$
7. 
$$\begin{cases} 2x+5y \\ 3x-6y \end{cases}$$
8. 
$$\begin{cases} 2x+5y \\ 3x-6y \end{cases}$$
9. 
$$\begin{cases} 2x+5y \\ 3x-6y \end{cases}$$

B. Solve each system of inequality graphically.

1. 
$$\begin{cases} y > x+3 \\ y \le -x+1 \end{cases}$$
2. 
$$\begin{cases} y > -2x+5 \\ y < \frac{1}{-}x \end{cases}$$
3. 
$$\begin{cases} x+y \le 6 \\ x-y > 8 \end{cases}$$
4. 
$$\begin{cases} x-2y \ge 10 \\ 2x+y \le -4 \end{cases}$$

### Problem Set

Solve each system of inequality graphically.

1. 
$$\begin{cases} x-y \geq 5 \\ 2x+3y \leq 12 \end{cases}$$
2. 
$$\begin{cases} x+y \geq 7 \\ 3x-y \leq 10 \end{cases}$$
3. 
$$\begin{cases} 2x-y \geq -2 \\ y < x+4 \end{cases}$$
4. 
$$\begin{cases} y > 2x-9 \\ y < 4x+1 \end{cases}$$

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$$\begin{cases} 5x + y > 3 \\ y \le x - 4 \end{cases}$$
2. 
$$\begin{cases} 2x + 5y < 10 \\ 3x - 4y \ge -8 \end{cases}$$
3. 
$$\begin{cases} (-1, 2) \\ (-3, 2) \end{cases}$$
3. 
$$\begin{cases} (2, 1) \\ (2, 0) \\ (2, 0) \end{cases}$$
4. 
$$\begin{cases} (2, 1) \\ (2, 0) \\ (2, 0) \end{cases}$$
5. 
$$\begin{cases} (-3, 2) \end{cases}$$

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$$\begin{cases} y > x+3 \\ y \le -x+1 \end{cases}$$
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