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:

1. Draw the graph of each inequality on the same coordinate plane. Shade the appropriate half-plane.
2. 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. $\begin{cases} 5x+y > 3 \\ y \leq x-4 \end{cases}$
   a. (-1, 2)
   b. (0, 0)
   c. (-3, 2)
2. $\begin{cases} 2x+5y < 10 \\ 3x-4y \geq -8 \end{cases}$
   a. (2, 1)
   b. (2, 0)
   c. $(\frac{1}{2}, 2)$

B. Solve each system of inequality graphically.

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

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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