

Systems of Linear Inequalities in Two Variables

Finite Math

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Quiz

Describe the dumbest conversation you have overheard recently.

Solving Systems of Linear Inequalities Graphically

Definition (Solution Region/Feasible Region)

Given a system of inequalities, the solution region or feasible region consists of all points (x, y) which simultaneously satisfy all of the inequalities in the system.

Example

Solve the following system of linear inequalities graphically:

$$\begin{array}{rclcl} 3x & + & y & \leq & 21 \\ x & - & 2y & \leq & 0 \end{array}$$

Now You Try It!

Example

Solve the following system of linear inequalities graphically:

$$\begin{array}{rclcl} 3x & + & y & \geq & 6 \\ x & - & 5y & \leq & 5 \end{array}$$

Corner Points

Definition (Corner Point)

A corner point of a solution region is a point in the solution region that is the intersection of two boundary lines.

Example

Solve the following system of linear inequalities graphically and find the corner points:

$$\begin{array}{rclcl} x & + & y & \leq & 10 \\ 5x & + & 3y & \geq & 15 \\ -2x & + & 3y & \leq & 15 \\ 2x & - & 5y & \leq & 6 \end{array}$$

Now You Try It!

Example

Solve the following system of linear inequalities graphically and find the corner points:

$$5x + y \geq 20$$

$$x + y \geq 12$$

$$x + 3y \geq 18$$

$$x \geq 0$$

$$y \geq 0$$

Bounded and Unbounded Regions

Definition (Bounded/Unbounded)

A solution region of a system of linear inequalities is bounded if it can be enclosed within a circle. If it cannot be enclosed within a circle, it is unbounded.

Question

Which of the regions in examples 1-4 are bounded? Which are unbounded?