7.6 Solve Linear Systems of Linear Inequalities

Goal • Solve systems of linear inequalities in two variables.

**VOCABULARY:**

**Example:**

- **Graph** $x < 5$
  - $T(0,0)$ $0 \leq 5$

- **Graph** $y \leq 5$
  - $T(0,0)$ $0 \leq 5$

**System of linear inequalities**

Consists of 2 linear inequalities with 2 variables.

**Example:**

$x < 5 - \text{dashed} - V\text{line} - m = \text{undefined}$

$y \leq 5 - \text{solid} - H\text{line} - m = 0$

**Solution of a system of linear inequalities**

Solution region: are all the points in the region where their graphs intersect.

**GRAPHING A SYSTEM OF LINEAR INEQUALITIES**

**Step 1** Graph the 1st inequality.

**Step 2** Graph the 2nd inequality.

**Step 3** Find the Intersection of the graphs.

**Step 4** The **Solution Region** is where the graphs intersect.

Use an **Arrow** to identify the solution **Region**.
Example 1: Graph the system of inequalities.

Inequality 1: \( x + 3y > 6 \)

Inequality 2: \( 2x - 3y \geq 3 \)

Step 1: Graph the 1st inequality.

\( x + 3y > 6 \) (use intercepts)

\( x: 6 \quad y: 2 \) dotted line

\( T(0,0) \) \( 0 > 6 \) F

Step 2: Graph the 2nd inequality.

\( 2x - 3y \geq 3 \) (put in \( y = mx + b \)) solid line

\( \frac{2x}{2} - \frac{3y}{3} \geq \frac{3}{2} \)

\( y \leq \frac{2}{3}x - 1 \)

Remember: when you multiply or divide the variable by a negative number, reverse the inequality!

Step 3: Find the intersection of the graphs.

Step 4: Mark the Solution Region with an arrow.

Check Point - Graph the system of linear inequalities.

2) \( y > -2x - 3 \)

\( m = -2/1 \quad b = -3 \)

\( T(0,0) \) \( 0 > -3 \) F

\( y < x \) Tricky!!

\( m = 1 \quad b = 0 \)

Pick a point to test \((4,1)\)

\( 1 < 4 \) T

3) \( x + y \leq 4 \)

\( x: 4 \quad y: 4 \)

\( T(0,0) \) \( 0 \leq 4 \) T

\( -y \geq -x + 6 \)

\( T(1, -1) \)

\( y \geq x - 6 \)

\( T(0,0) \) \( 0 \leq 6 \) or \( 0 \geq -6 \)