Math 1324
Section 1.4
Graphs of Linear Inequalities

The videos corresponding to this worksheet can be found at
https://online.math.uh.edu/Math1324/.
UH students can alternatively view the videos within the Math 1324 textbook.

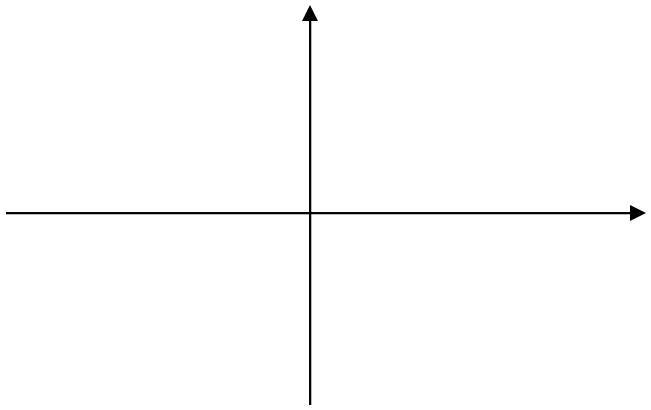
A **linear inequality** is a linear equation with the equal symbol replaced with any one of $\leq, \geq, <,$ or $>$.

Steps to Graphing a Linear Inequality in Two Variables

1. Rewrite the inequality as an equation.
2. Graph either a solid line (if the inequality contains $\leq$ or $\geq$) or a dashed line (if the inequality contains $<$ or $>$).
3. Choose a point not on the line, and plug it into the inequality.
4. If the test point is satisfied in the inequality, shade the half-plane containing this point. Otherwise, shade the other half-plane.

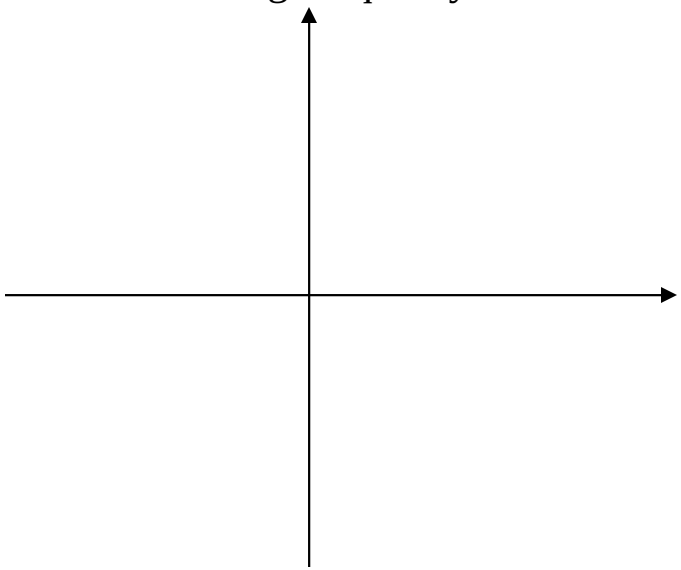
Example 1: Determine the solution set for the following inequality.

$y < x - 3$



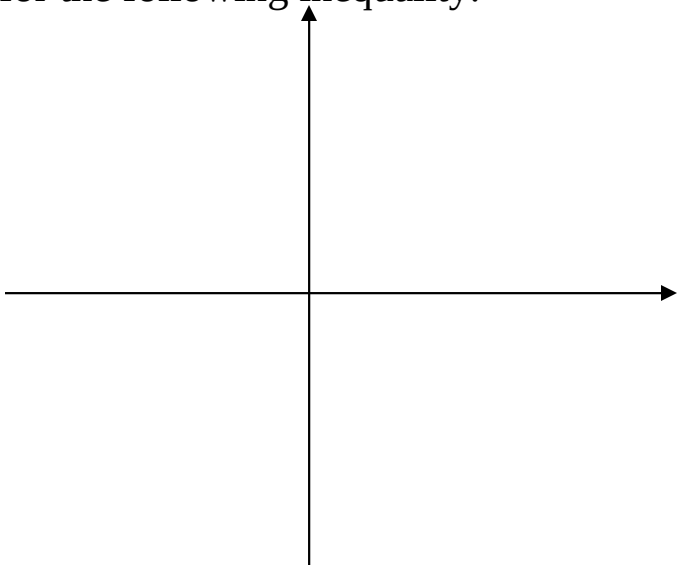
Example 2: Determine the solution set for the following inequality.

$2x - 5y \geq 10$



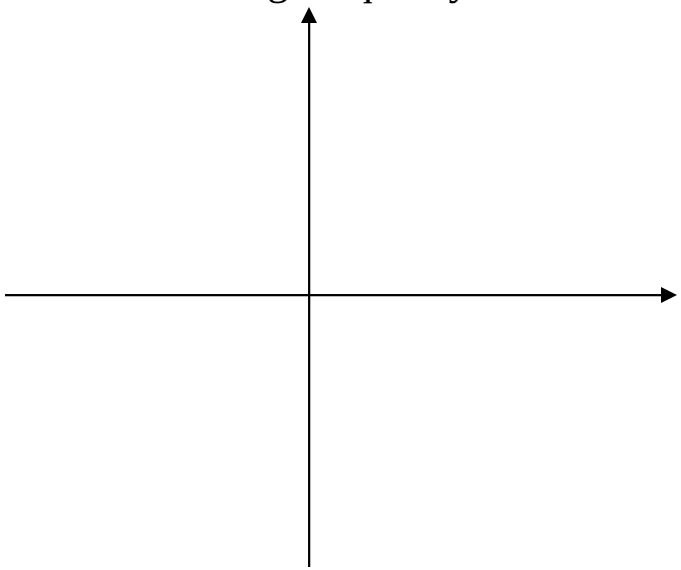
Example 3: Determine the solution set for the following inequality.

$y \leq 4$



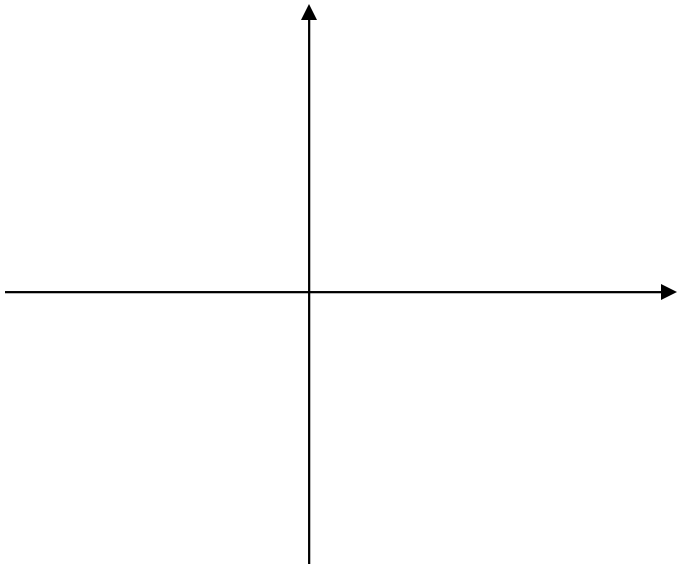
Example 4: Determine the solution set for the following inequality.

$x > -1$



Example 5: Determine the solution set for the following inequality.

$8x + 4y > 0$



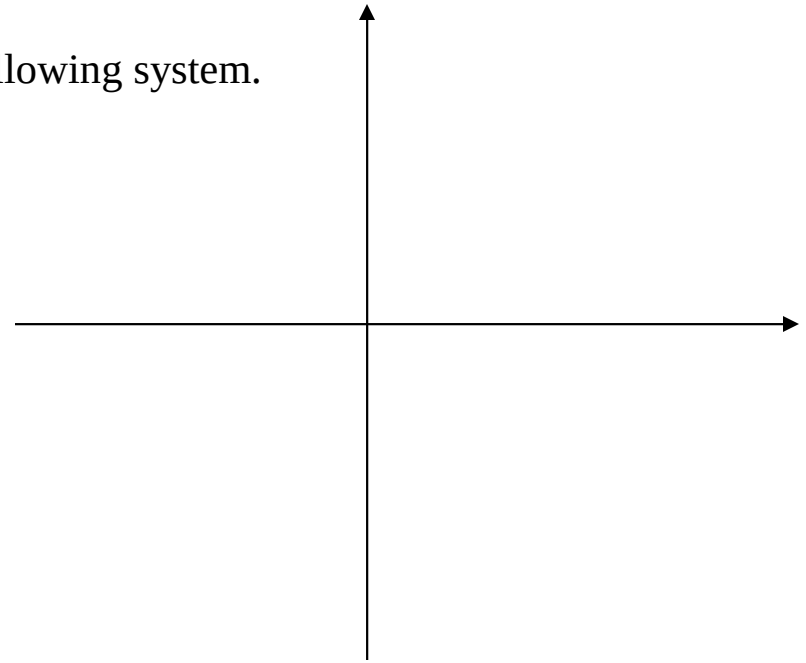
The **solution set to a system of linear inequalities** is the set of all ordered pairs that satisfies all of the inequalities. Graphically, it's the intersection of all the shaded regions.

To graph a system of linear inequalities, we graph each inequality as before then find where all shaded regions intersect. The intersection represents the solution set to the system of inequalities.

Example 6: Determine the solution set for the following system.

$x + y \leq 3$

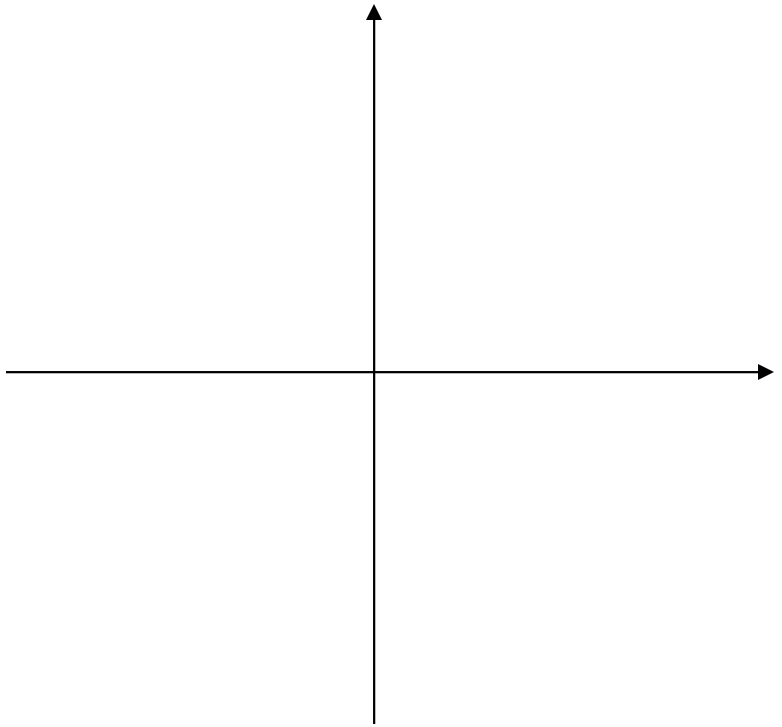
$3x - y \leq 0$



Example 7: Determine the solution set for the following system.

$25x - 10y > 50$

$x \leq 4$



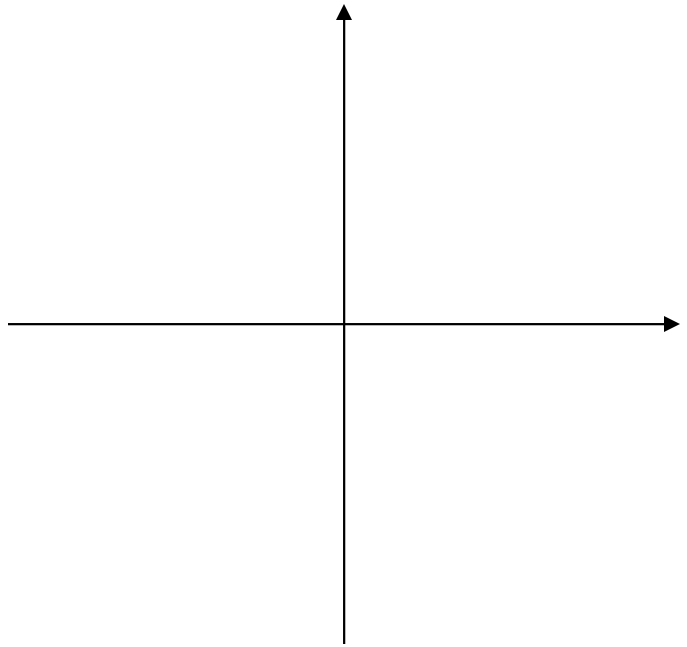
Example 8: Determine the solution set for the following system.

$x + 2y \leq 10$

$2x + y \geq 8$

$x \geq 0$

$y \geq 0$

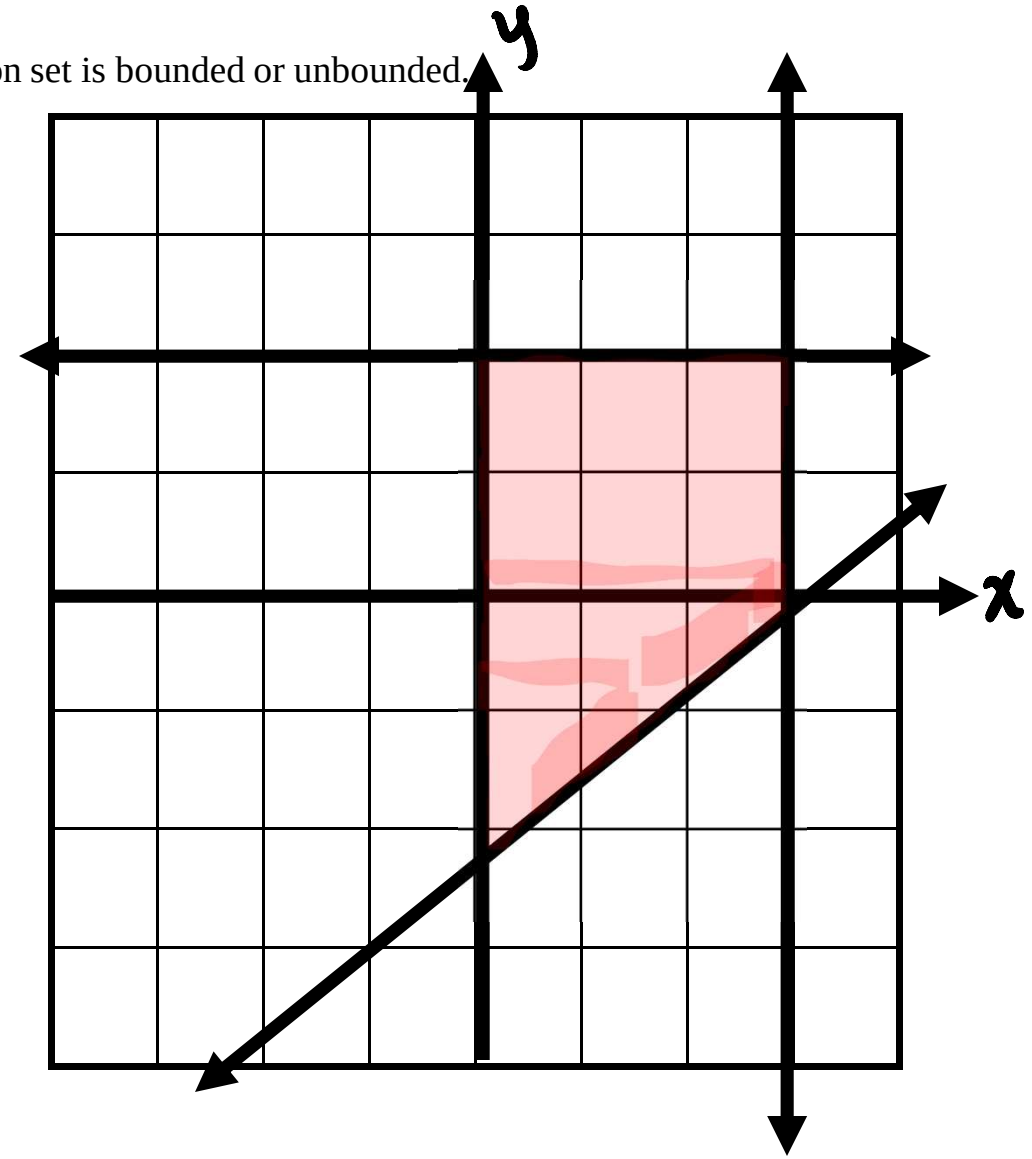


Bounded and Unbounded Solution Sets

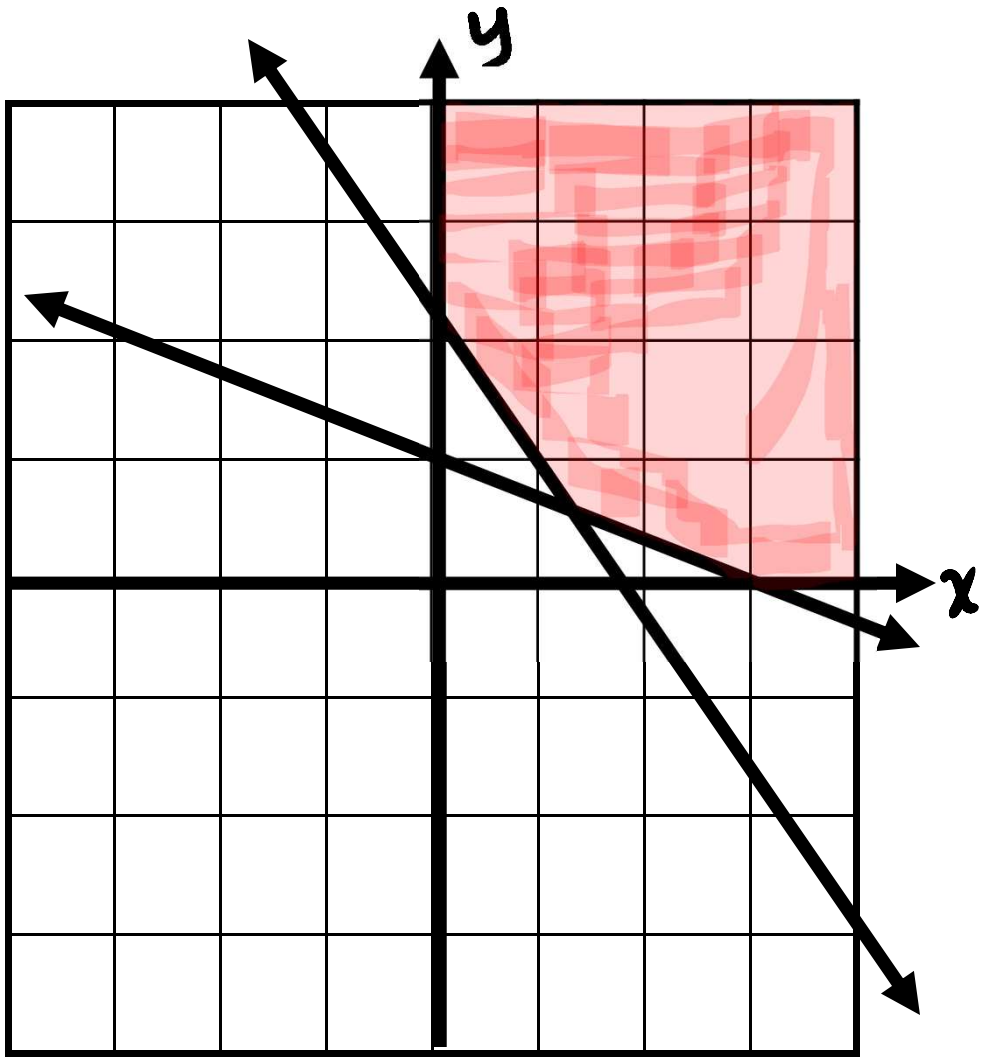
An **unbounded** set is a set that has no bound and continues indefinitely.

A **bounded** set is a set that has a boundary around the its solution set.

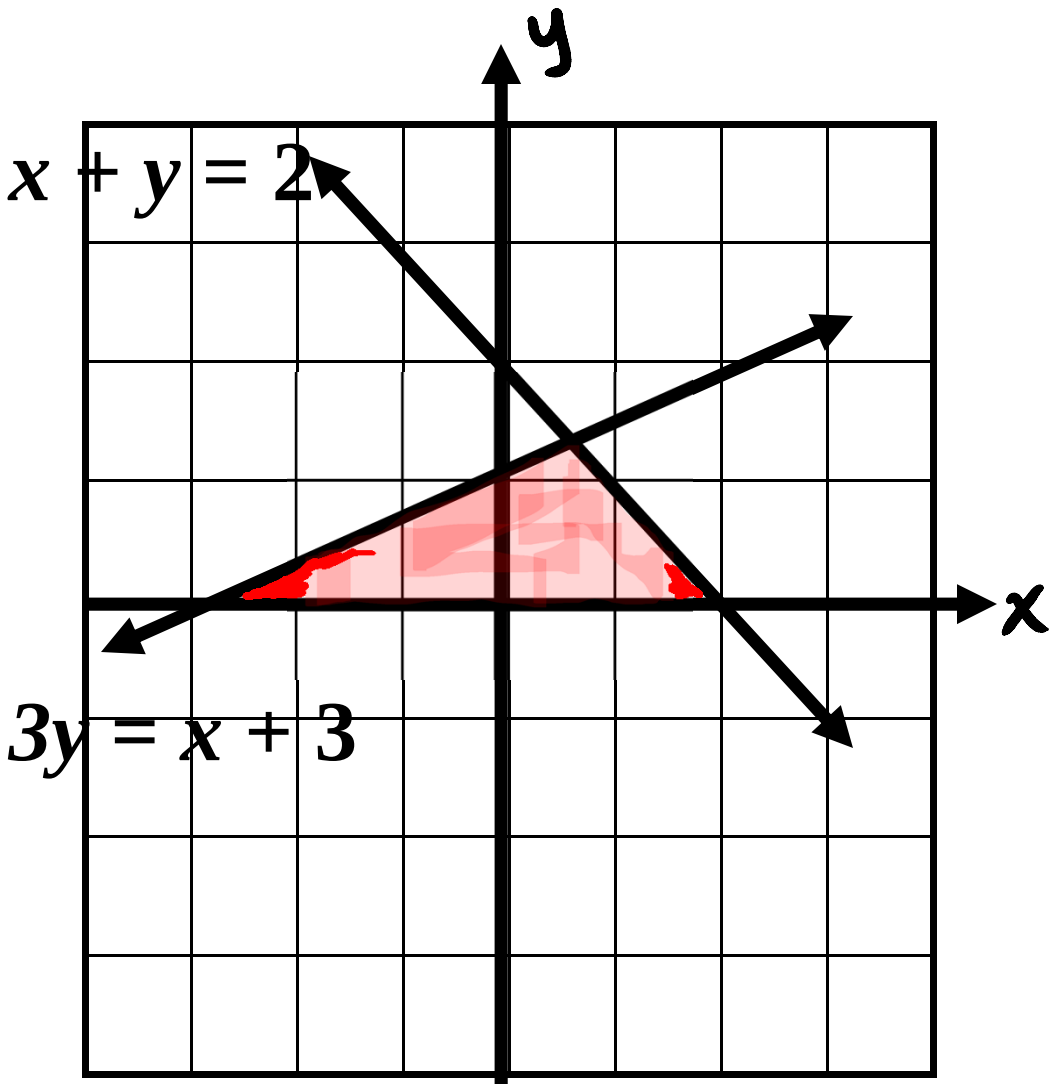
Example 9: Determine if the following solution set is bounded or unbounded.



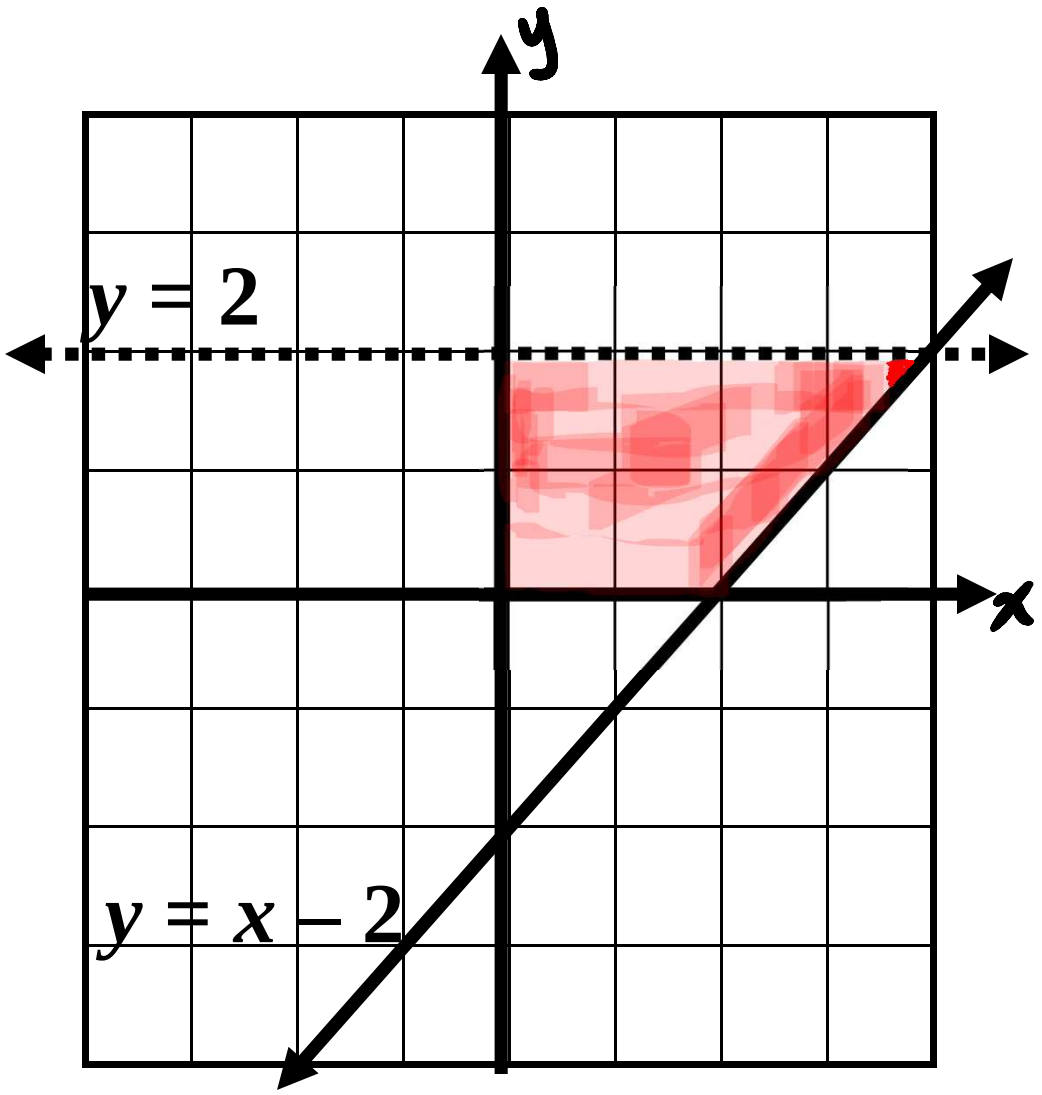
Example 10: Determine if the following solution set is bounded or unbounded.



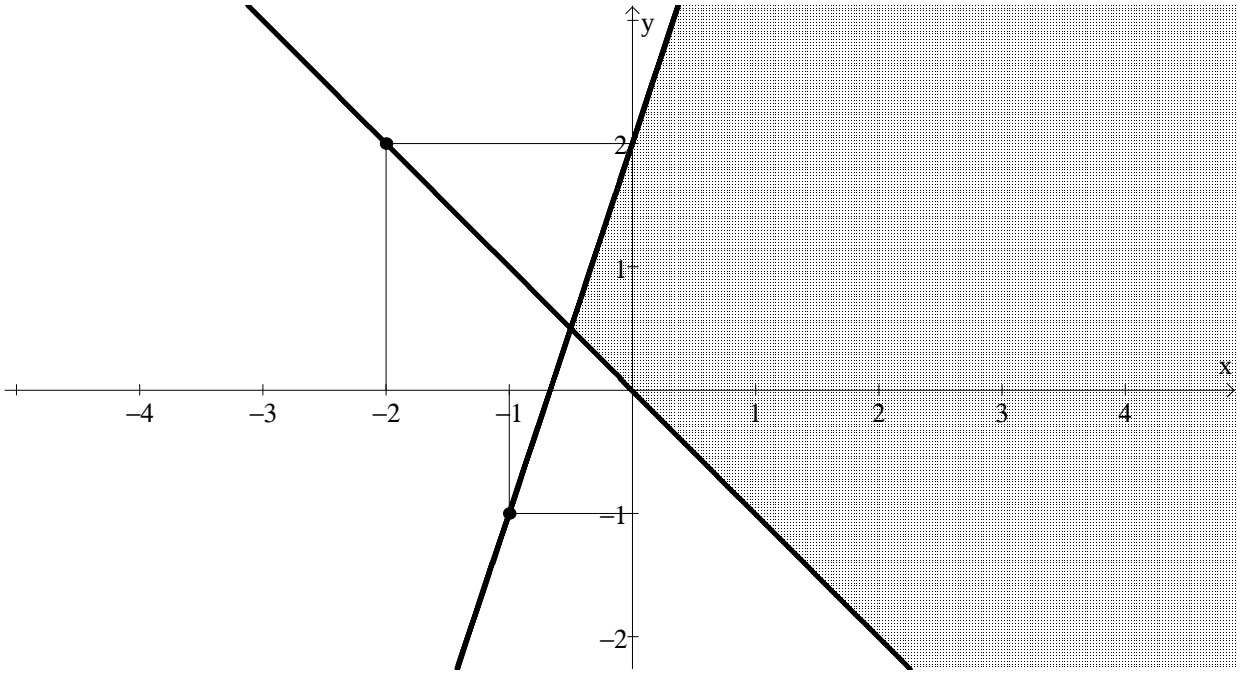
Example 11: Write a system of linear inequalities that describes the shaded region.



Example 12: Write a system of linear inequalities that describes the shaded region.



Example 13: Write a system of linear inequalities that describes the shaded region.



Example 14: Write a system of linear inequalities that describes the shaded region.