6.2 - Part 2

Tuesday, April 21, 2015 9:42 AM

6.2- Graphing Systems of Linear Inequalities

Goal: Explore graph of situations that can be modeled by system of two linear inequalities in two variables.

- The solution set of a system of linear inequalities in two variables x and y is the set of all points (x, y) that satisfy each inequality of the system.
- The graphical solution of such a system may be obtained by graphing the solution set for each inequality independently and then determining the region in common with each solution set.

A system of inequalities is a combination of two or more inequalities. The solution of a system is the set of all ordered pairs that satisfy all the inequalities.

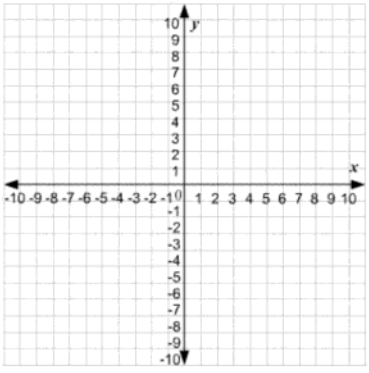
For a system of linear inequalities, the solution is the region where the shading for each inequality overlaps.

STEPS:

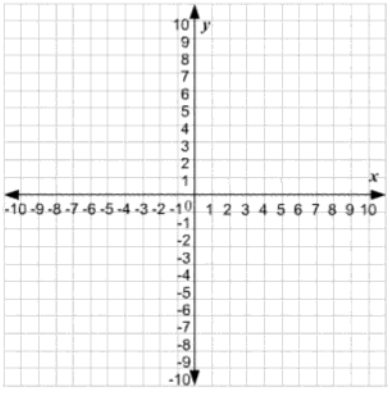
1) Change each inequality to $y = mx + b$ form and graph (remember the rules for solid and dashed lines)
2) Shade the appropriate area of each line. The solution lies in the double "cross hatch" area
3) If the solution regions for the linear inequality in the system DO NOT overlap, there is NO solution.
4) Be sure that you consider the range and domain restrictions if they exist
5) Check your graph by selecting a coordinate point in the double "cross hatch" area.

Example 1.

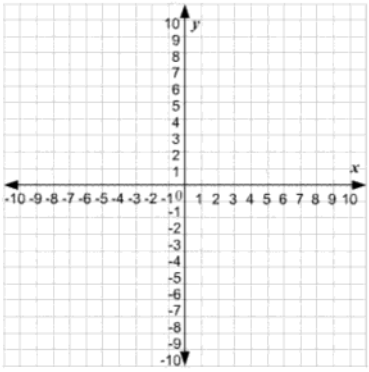
a) $y \geq -2x$
$-3 < x - y$



b) $x + 3y \geq 0$
$x + y \geq 2$

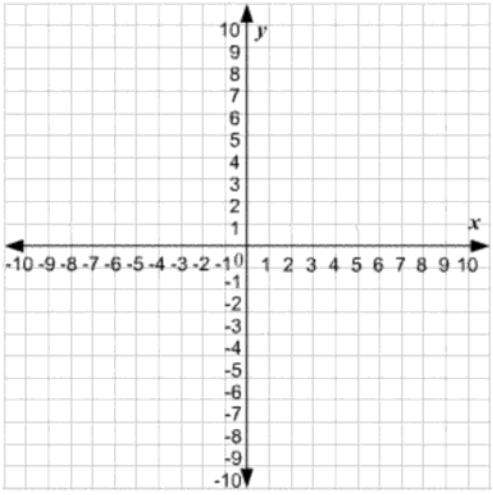


c) $x + y \leq -2$
$2y \geq x$

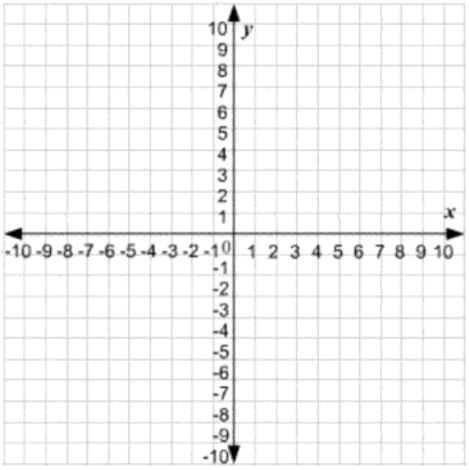


Example 2. Graph each system of linear inequalities. Justify your representation of the solution set.

a)



b)

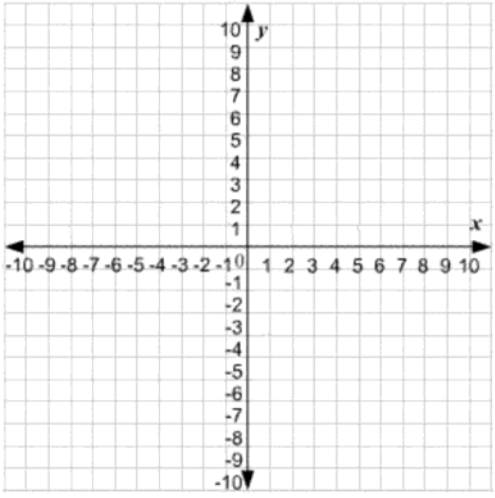


Example 3. Graph the solution set of the system of inequalities.

$y \geq 2x + 4$

$y \leq -x - 2$

$x \geq -6$



- For a system of linear equations, the solution is the point where the two lines intersect.
- For a system of linear inequalities, the solution is the region where the shading of each inequality overlaps.

Example.

$y \leq -3x - 3$

$y \geq -3x + 2$

6.3- Graphing to Solve System of Linear Inequalities

Goal: Solve problems by modeling systems of linear inequalities. We have done a lot of graphing to solve systems. We will be building on this and showing possible solutions on the graph as well as written out.

Example.

a)

1. $y \geq 2x - 1$
2. $y < x + 5$

Test

(0,0)

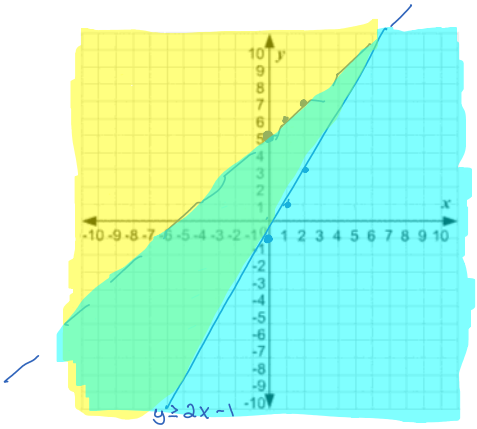
$0 \geq 2(0) - 1$

$0 \geq -1$

(0,0)

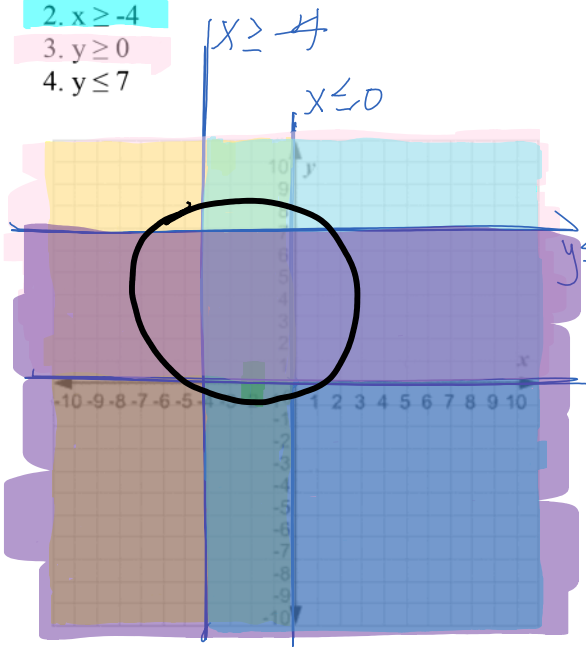
$0 < 0 + 5$

$0 < 5$



b)

1. $x \leq 0$
2. $x \geq -4$
3. $y \geq 0$
4. $y \leq 7$



1 Test (2,2)

$2 \leq 0$ X

2 Test (0,0)

$0 \geq -4$ ✓

3. (0,5)

$5 \geq 0$ ✓

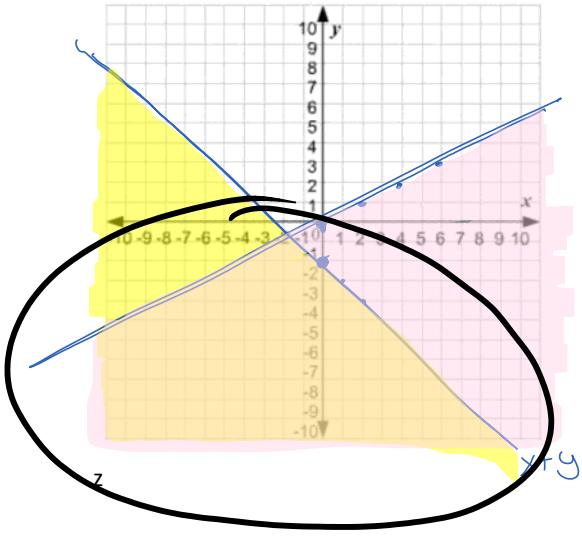
4. (0,6)

$0 \leq 7$ ✓

Example. For the system below, explain whether the boundaries and their points of intersection are a part of the solution region.

$\{(x, y) \mid x + y \leq -2,\ x, y \in I\}$

$\{(x, y) \mid 2y \leq x,\ x, y \in I\}$



$x + y \leq -2$

$-x \quad -x$

$y \leq -x - 2$

$(0,0)$

$0 + 0 \leq -2$

$0 \leq -2$ ✗

$2y \leq x$

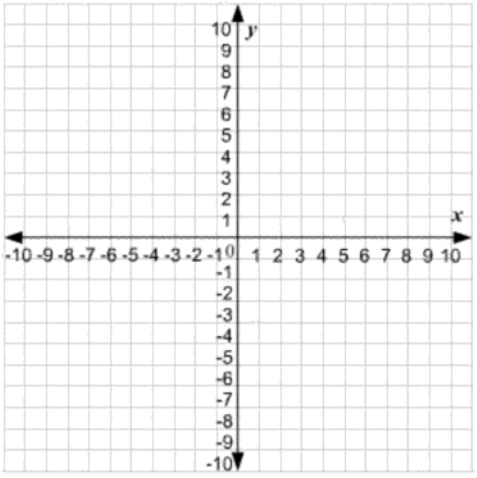
$y \leq \frac{1}{2}x + 0$

$2(1) \leq (1)$

$2 \leq 1$ ✗

Example. Consider the system of equations. $2x + y = 2$, $x - 3y = 15$
Solve the system of equations graphically by:

a) writing both equations in slope-intercept form
b) making a table of values and plotting the points.

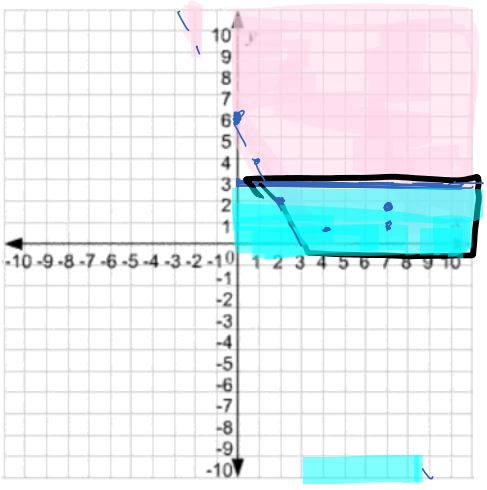


Example.
Graph the solution set for the following system of inequalities. State two possible solutions from the set. Check your work.

$\{(x, y) \mid 2x + y > 6, x, y \in W\}$
$\{(x, y) \mid y \leq 3, x, y \in W\}$

(7, 2)
$2x+y>6$
$2(7)+2>6$
$14+2>6$
$16>6$

$y \leq 3$
$2 \leq 3$ ✓



$-2x \quad -2x$
$2x+y>6$
$y>-2x+6$

$2(0)+0>6$
$0+0>6$
$0>6$ ×

$y \leq 3$
$0 \leq 3$

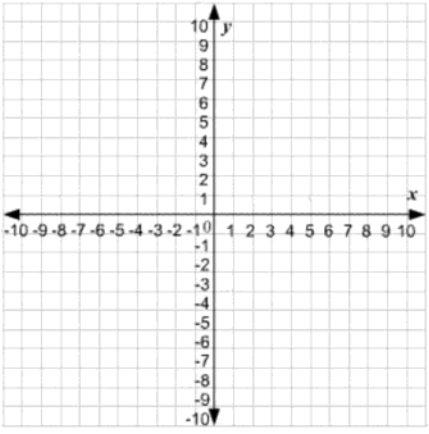
(4, 1)
$2x+y>6$
$2(4)+1>6$
$8+1>6$
$9>6$ ✓

$y \leq 3$
$1 \leq 3$ ✓

Example. To raise funds to buy new instruments, the band committee has 500 T-shirts to sell. The T- shirts come in red or blue. Based on sales of the same T-shirts at a fundraiser five years ago, the committee expects to sell at least twice as many blue T-shirts as red T-shirts.

a) Define the variables and restrictions. Write a system of linear inequalities that models the situation.

b) Graph the system of inequalities.



c) Suggest a combination of T-shirt sales that could be made.