6.2 Notes - Part 1

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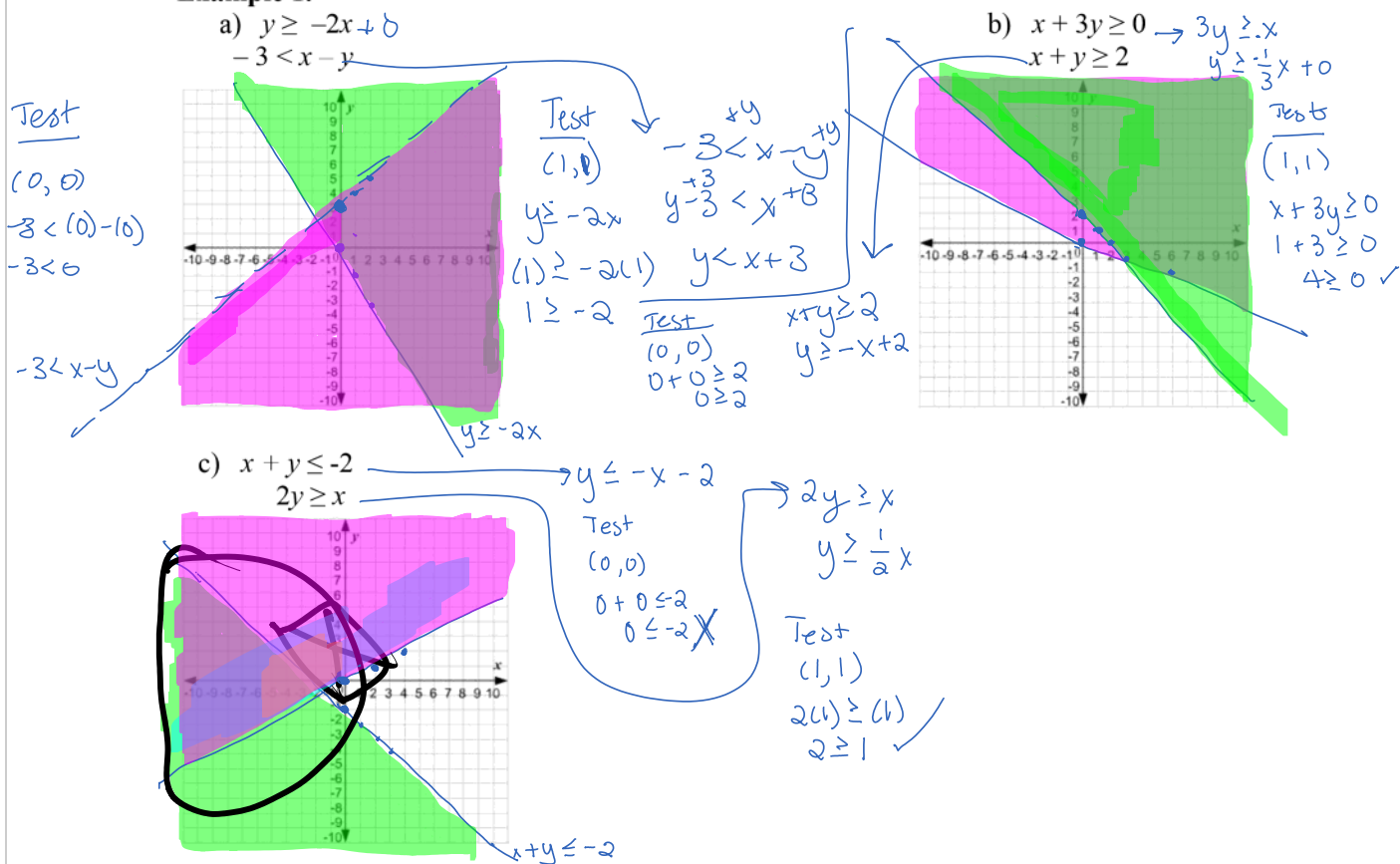- The solution set of a system of linear inequalities in two variables x and y is the set of all points (x, y) that satisfy each inequality of the system.
- The graphical solution of such a system may be obtained by graphing the solution set for each inequality independently and then determining the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

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.
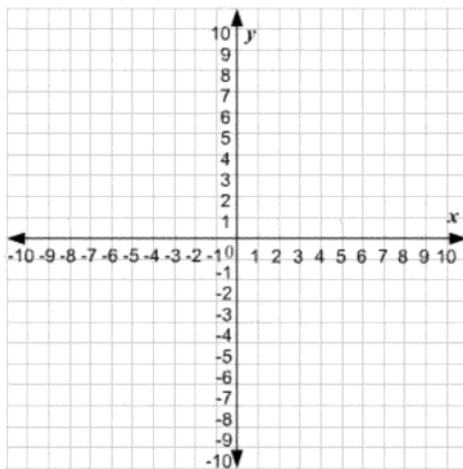
Example 1.

a) $y \geq -2x + 0$
   $-3 < x - y$

Test

$(0,0)$

$-3 < (0)-(0)$

$-3 < 0$

$-3 < x-y$

Test
$(1,0)$

$-3 < x - y$ $+y$
    $+3$
$y-3 < x$ $+3$
$y < x+3$

$y \geq -2x$
$(1) \geq -2(1)$
$1 \geq -2$

Test
$(0,0)$
$0+0 \geq 2$
$0 \geq 2$

$x+y \geq 2$
$y \geq -x+2$

$y \geq -2x$

b) $x+3y \geq 0 \rightarrow 3y \geq -x$
   $x+y \geq 2$ $y \geq \frac{-1}{3}x + 0$

Tests
$(1,1)$

$x+3y \geq 0$
$1+3 \geq 0$
$4 \geq 0$ ✓

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

Test
$(0,0)$

$0+0 \leq -2$
$0 \leq -2$ ✗

$2y \geq x$
$y \geq \frac{1}{2}x$

Test
$(1,1)$

$2(1) \geq (1)$
$2 \geq 1$ ✓

$x+y \leq -2$

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

a)
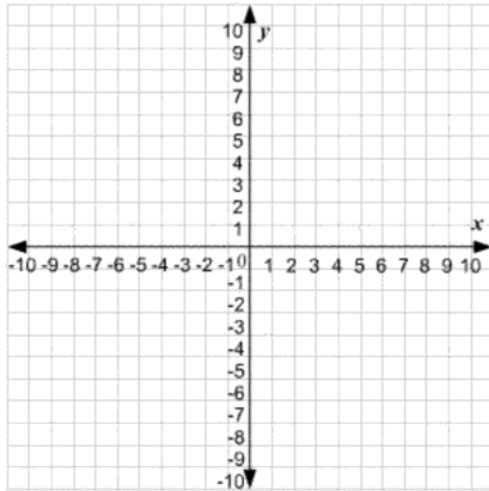
b)

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

$y \geq 2x + 4$

$y \leq -x - 2$

$x \geq -6$