

Questions

1. Graph the solution to the system of inequalities:

$$\begin{aligned}y &\geq 2x - 1 \\x + y &\leq 6\end{aligned}$$

2. Graph the solution to the system of inequalities:

$$\begin{aligned}x + 2y &< 6 \\y &< 3\end{aligned}$$

3. Graph the solution to the system of inequalities:

$$\begin{aligned}y &> -3 \\x &< 2\end{aligned}$$

4. Graph the solution to the system of inequalities, and find the vertex of the solution:

$$\begin{aligned}x + y &\geq 2 \\y + 4x &\leq -1\end{aligned}$$

Solutions

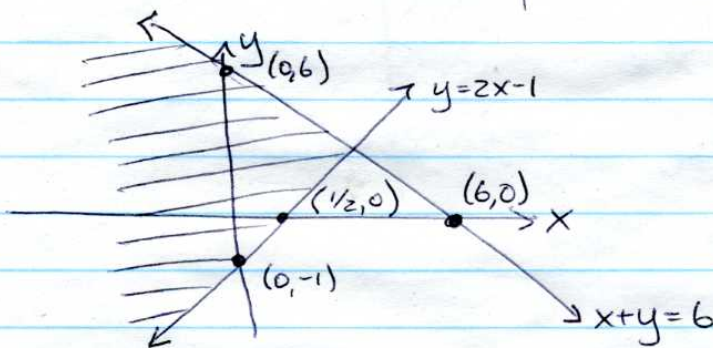
1 ~~1~~) $y \geq 2x - 1$
 $x + y \leq 6$

Sketch $y = 2x - 1$

if $x = 0$ $y = -1 \Rightarrow (0, -1)$
 if $y = 0$ $x = \frac{1}{2} \Rightarrow (\frac{1}{2}, 0)$
 test $(0, 0)$: ~~$0 \geq -1$~~ true.

Sketch $x + y = 6$

if $x = 0$ $y = 6 \Rightarrow (0, 6)$
 if $y = 0$ $x = 6 \Rightarrow (6, 0)$
 test $(0, 0)$: $0 \leq 6$ true



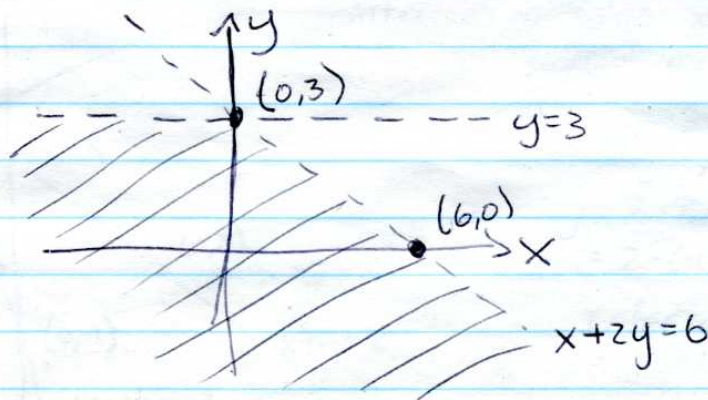
2 ~~2~~) $x + 2y < 6$
 $y < 3$

Sketch $x + 2y = 6$

if $x = 0$ $y = 3 \Rightarrow (0, 3)$
 if $y = 0$ $x = 6 \Rightarrow (6, 0)$
 test $(0, 0)$: $0 < 6$ true

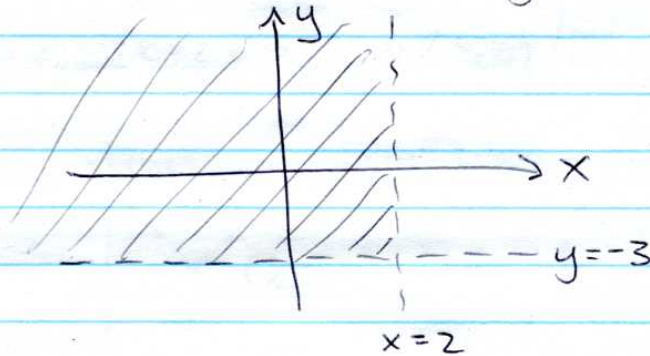
Sketch $y < 3$

This is just the region below $y = 3$.



3) $y > -3$
 $x < 2$

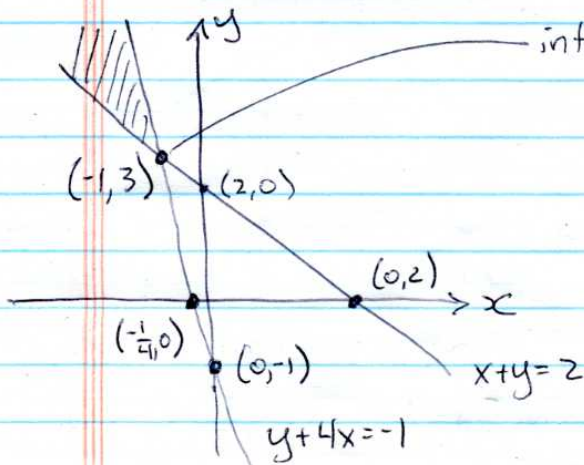
Sketch $y > -3$: This is the region above $y = -3$.
 Sketch $x < 2$: This is the region to the left of $x = 2$



4) $x + y \geq 2$
 $y + 4x \leq -1$

sketch $x + y = 2$:
 if $x = 0$, $y = 2 \Rightarrow (0, 2)$.
 if $y = 0$, $x = 2 \Rightarrow (2, 0)$.
 test $(0, 0)$ $0 \geq 2$ False

sketch $y + 4x = -1$:
 if $x = 0$ $y = -1 \Rightarrow (0, -1)$.
 if $y = 0$ $x = -1/4 \Rightarrow (-1/4, 0)$.
 test $(0, 0)$ $0 \leq -1$ False.



intersection: solve $x + y = 2$
 subtract $4x + y = -1$

$$\begin{array}{r} x + y = 2 \\ -(4x + y = -1) \\ \hline -3x = 3 \\ x = -1 \end{array}$$

$y = 2 - x$
 $= 2 - (-1) = 3$

Intersection is at $(-1, 3)$.