

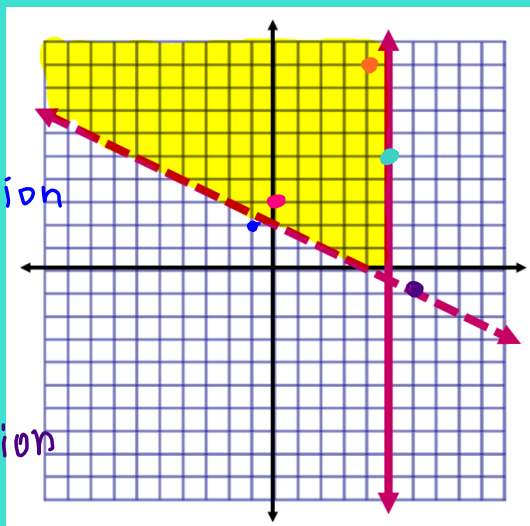
Systems of Linear Inequalities

- A collection of linear inequalities in the same variables
- The solution is any ordered pair that satisfies each of the inequalities of the system
- The graph of a system is the graph of all solutions of the system

Example 1

Tell whether the ordered pair is a solution.

- a) $(-1, 2)$ not a solution
 b) $(0, 3)$ solution
 c) $(4, 9)$ solution
 d) $(5, 5)$ solution
 e) $(6, -1)$ not a solution



Example 2

Graph the system.

$$y \geq -3x - 1$$

$$y < x + 2$$

$$y \geq -3x - 1$$

$$m = -\frac{3}{1}$$

$$y\text{-int} = -1$$

Solid line

shade above

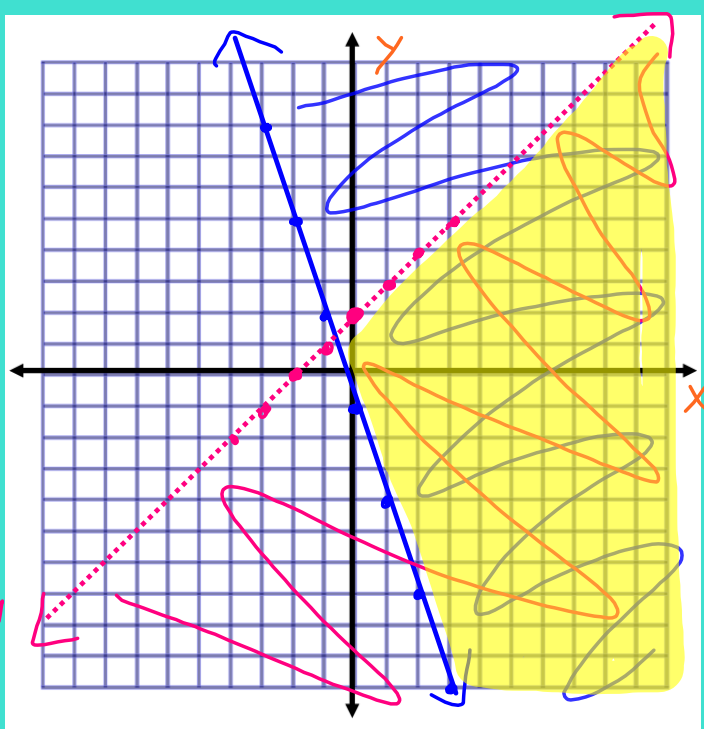
$$y < x + 2$$

$$m = 1$$

$$y\text{-int} = 2$$

dotted line

shade below



Example 3

Graph the system.

$$x - 2y \leq 3$$

$$y > 3x - 4$$

$$\begin{array}{r} x - 2y \leq 3 \\ -x \quad -x \\ \hline \end{array}$$

$$\begin{array}{r} -2y \leq -x + 3 \\ -2 \quad -2 \quad -2 \\ \hline \end{array}$$

$$y \geq \frac{1}{2}x - \frac{3}{2}$$

$$m = \frac{1}{2}$$

$$y\text{-int} = -\frac{3}{2}$$

solid

above

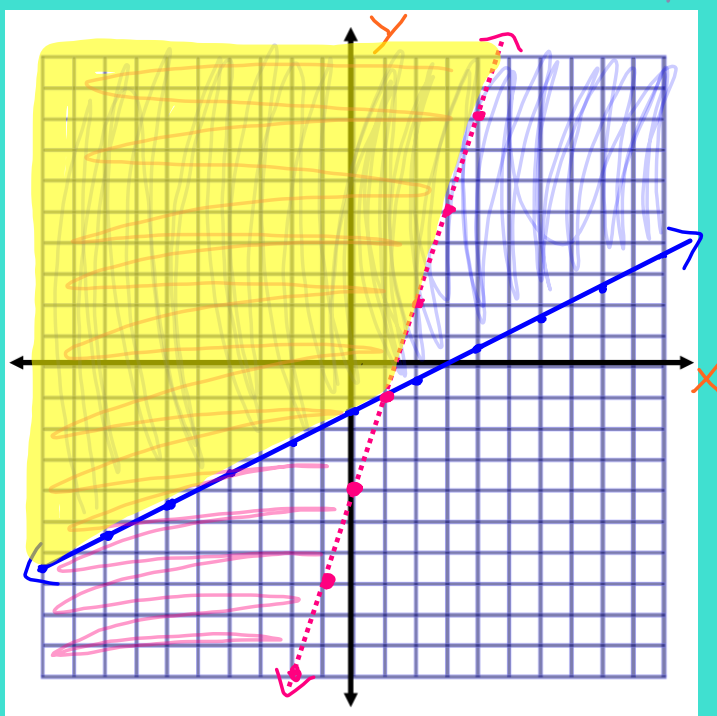
$$y > 3x - 4$$

$$m = \frac{3}{1}$$

$$y\text{-int} = -4$$

dotted

above

Example 4

Graph the system.

$$x \geq 0 \quad \text{solid vert. line}$$

$$y \geq 0 \quad \text{solid hor. line}$$

$$4x + 3y \leq 24$$

$$\begin{array}{r} 4x + 3y \leq 24 \\ -4x \quad -4x \\ \hline 3y \leq -4x + 24 \\ \frac{3y}{3} \leq \frac{-4x + 24}{3} \end{array}$$

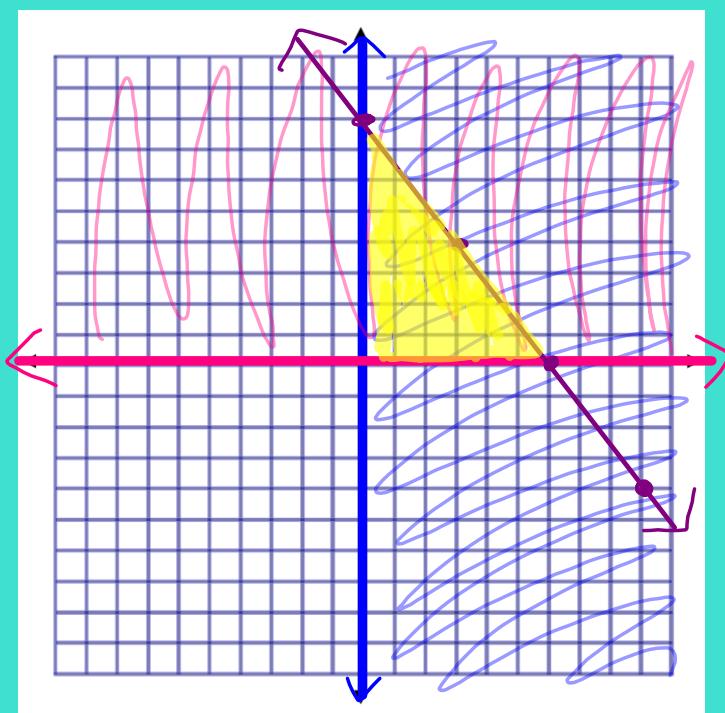
$$y \leq -\frac{4}{3}x + 8$$

$$m = -\frac{4}{3}$$

$$y\text{-int} = 8$$

solid

below



Example 5

Graph the system.

$$\left. \begin{array}{l} x \leq 0 \\ y > 0 \end{array} \right\} \text{QII}$$

$$x - y \geq -2$$

$$\begin{array}{r} -x \\ \hline -y \geq \frac{-x}{-1} - \frac{-2}{-1} \end{array}$$

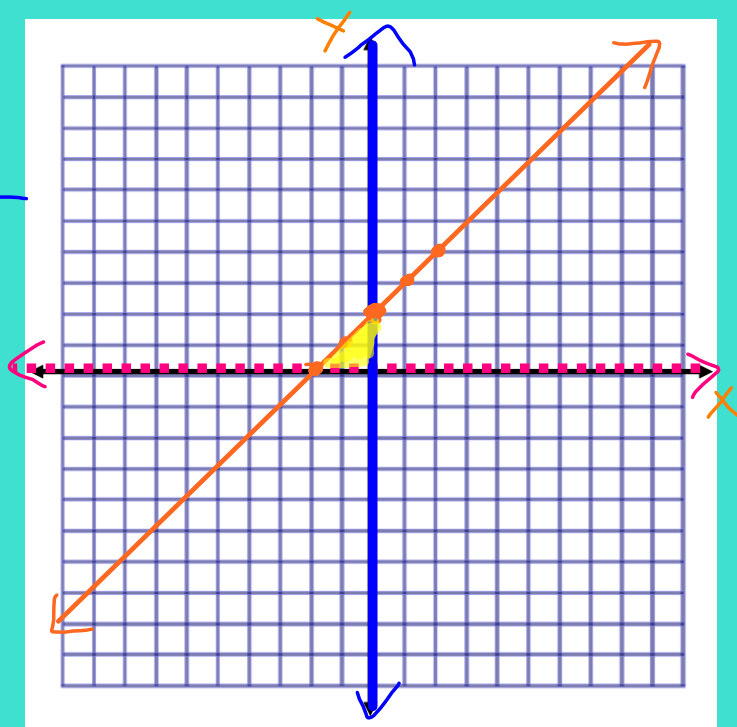
$$y \leq x + 2$$

$$m = \frac{1}{1}$$

$$y = 2$$

solid

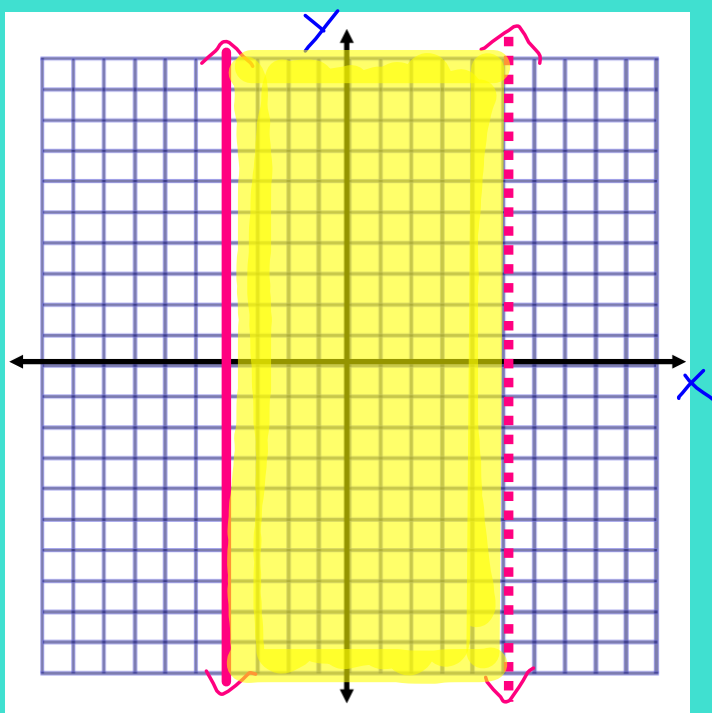
below

Example 6

Graph the system.

$$x < 5$$

$$x \geq -4$$

} vert.
lines

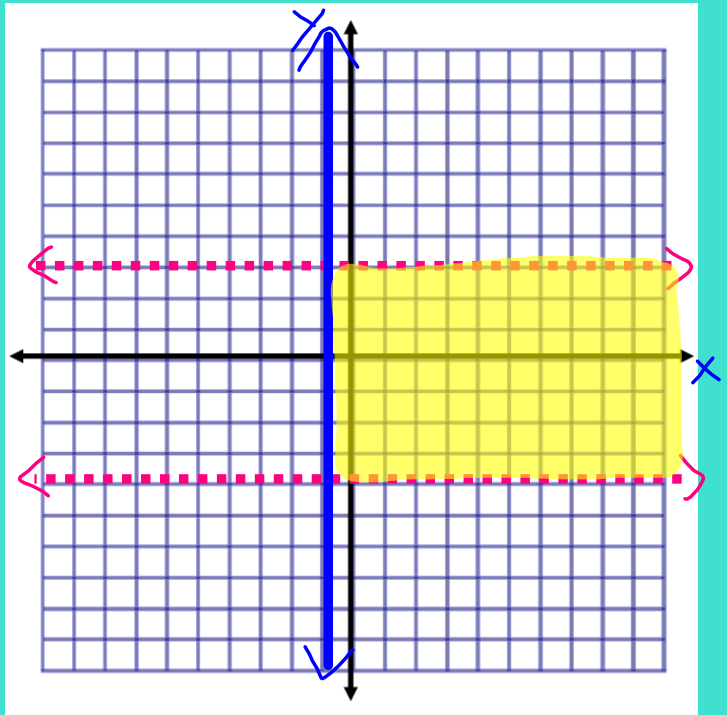
Example 7

Graph the system.

$$y > -4 \quad \text{hor.}$$

$$x \geq -1 \quad \text{vert.}$$

$$y < 3 \quad \text{hor.}$$

Example 8

Graph the system.

$$2x - 3y > -6$$

$$5x - 3y < 3$$

$$x + 3y > -3$$

$$\begin{array}{r} 2x - 3y > -6 \\ -2x \quad -2x \\ \hline -3y > -2x - 6 \\ -3 \quad -3 \quad -3 \\ \hline y < \frac{2}{3}x + 2 \\ m = \frac{2}{3} \\ y\text{-int} = 2 \\ \text{dotted} \\ \text{below} \end{array}$$

$$\begin{array}{r} 5x - 3y < 3 \\ -5x \quad -5x \\ \hline -3y < -5x + 3 \\ -3 \quad -3 \quad -3 \\ \hline y > \frac{5}{3}x - 1 \\ m = \frac{5}{3} \\ y\text{-int} = -1 \\ \text{dotted} \\ \text{above} \end{array}$$

$$\begin{array}{r} x + 3y > -3 \\ -x \quad -x \\ \hline 3y > -x - 3 \\ 3 \quad 3 \quad 3 \\ \hline y > -\frac{1}{3}x - 1 \\ m = -\frac{1}{3} \\ y\text{-int} = -1 \\ \text{dotted} \\ \text{above} \end{array}$$

