

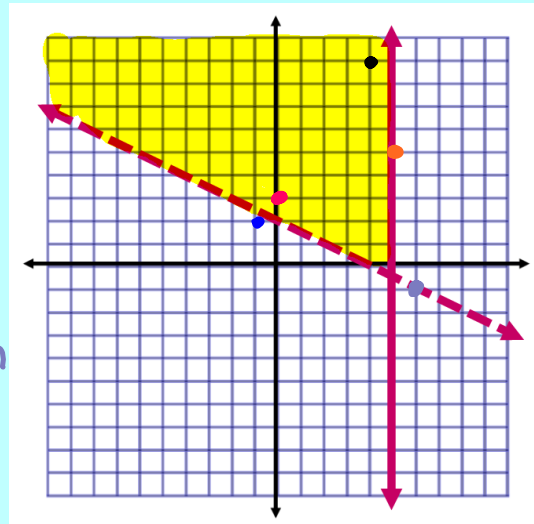
6.6 Systems of Linear Inequalities

- 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.

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

$$y < x + 2$$

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

$$m = -3$$

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

solid line

shade above
y-int

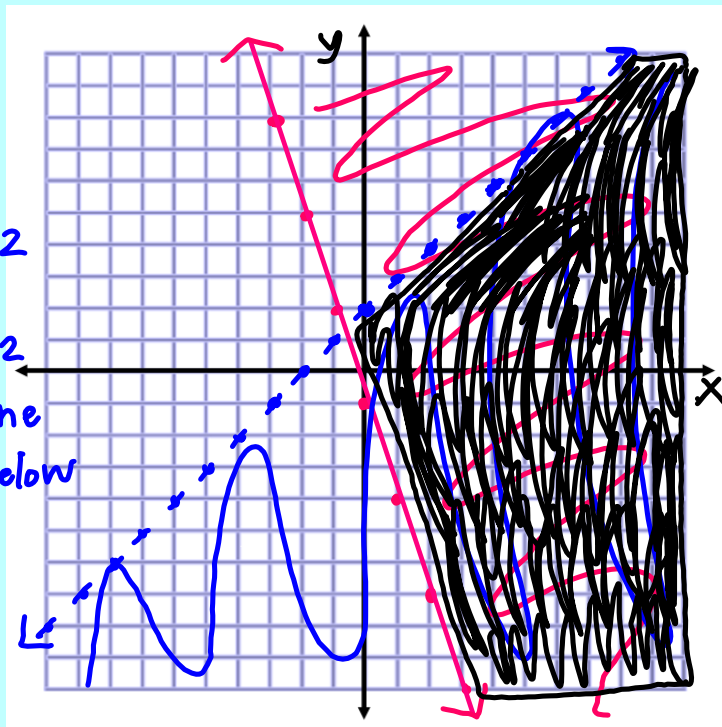
$$y < x + 2$$

$$m = 1$$

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

dotted line

shade below
y-int



Example 3

Graph the system.

$$x - 2y \leq 3$$

$$y > 3x - 4$$

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

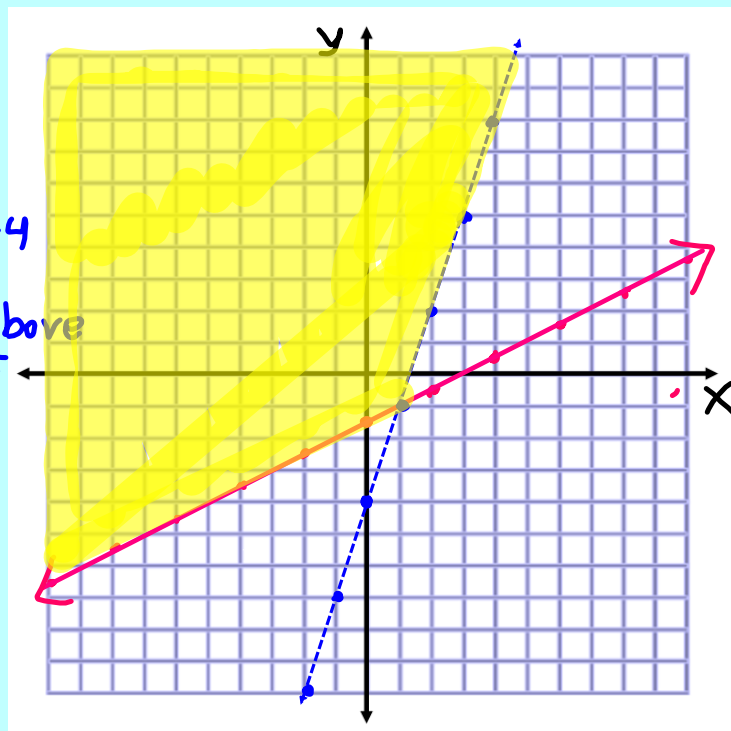
$$\begin{array}{r} -2y \leq -x + 3 \\ -2 \quad -2 \quad -2 \\ \hline \end{array}$$

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

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

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

Solid line

Shade above
y-int
 $m=3$
 $y\text{-int}=-4$
 dotted
 shade above
 y-int
Example 4

Graph the system.

$$x + y \geq 5$$

$$x + y < 1$$

$$\begin{array}{r} x + y \geq 5 \\ -x \quad -x \\ \hline \end{array}$$

$$y \geq -x + 5$$

$$m = -1$$

$$y\text{-int} = 5$$

Solid

shade
above
y-int

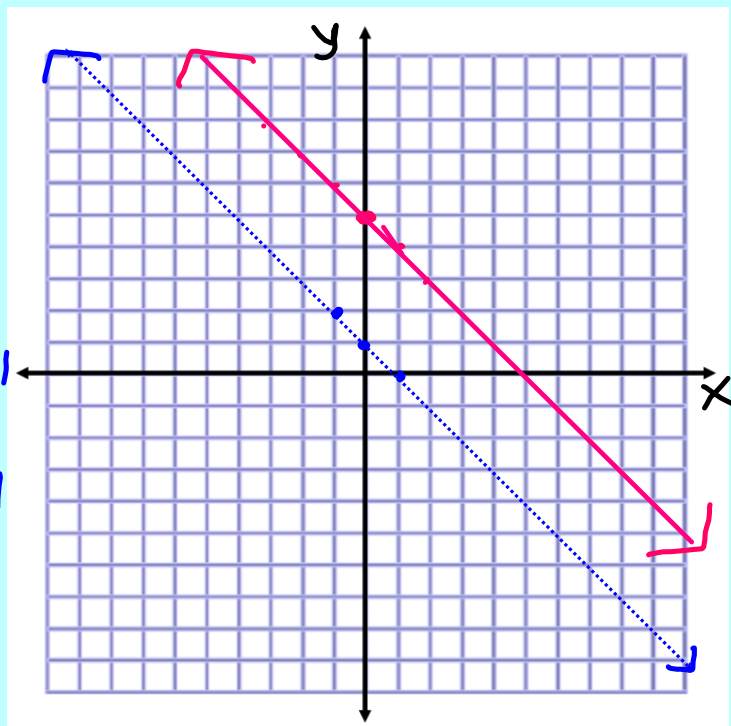
$$\begin{array}{r} x + y < 1 \\ -x \quad -x \\ \hline \end{array}$$

$$y < -x + 1$$

$$m = -1$$

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

dotted

shade
below
y-int

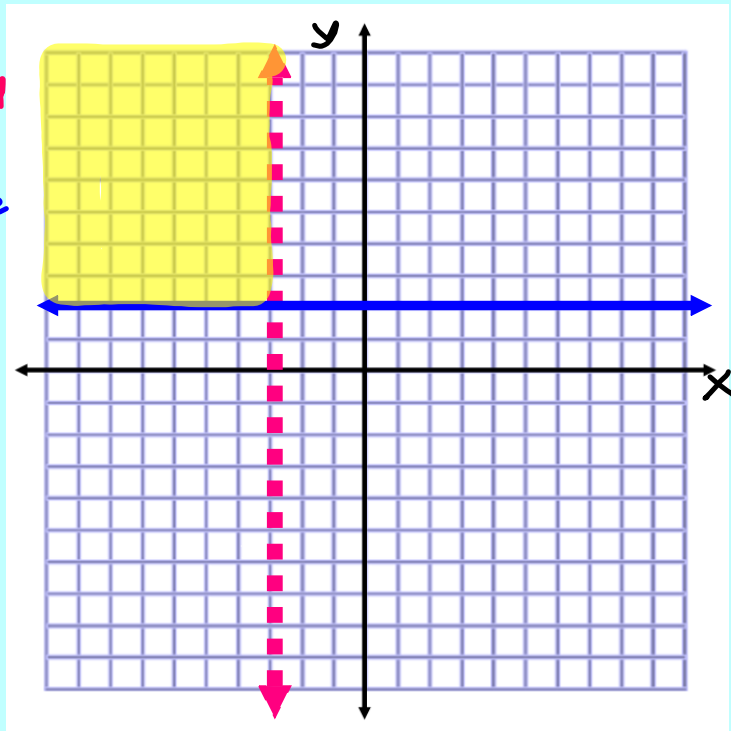
no solution

Example 5

Graph the system.

$$x < -3 \text{ vert. dotted shade left}$$

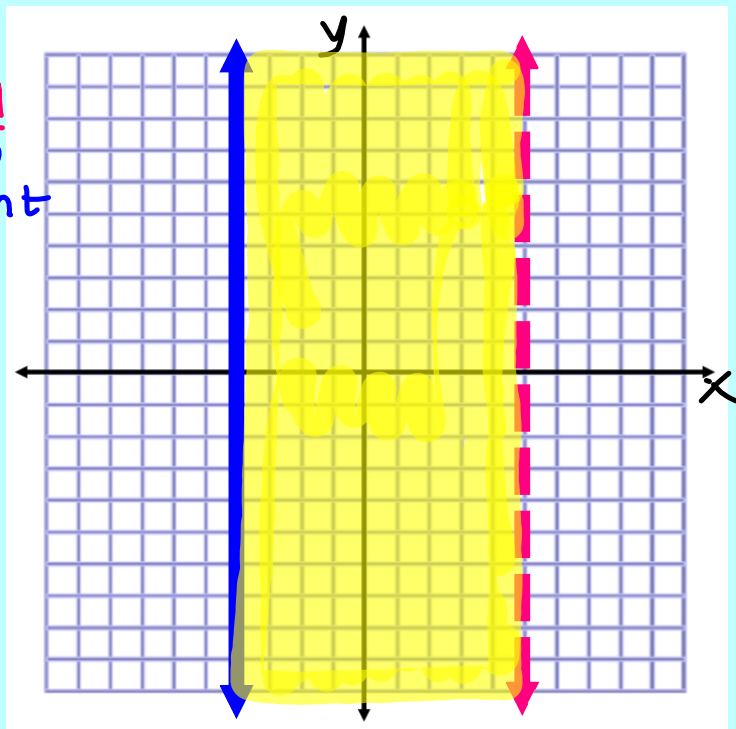
$$y \geq 2 \text{ hor. solid shade above}$$

Example 6

Graph the system.

$$x < 5 \text{ vert. dotted shade left}$$

$$x \geq -4 \text{ vert. solid shade right}$$



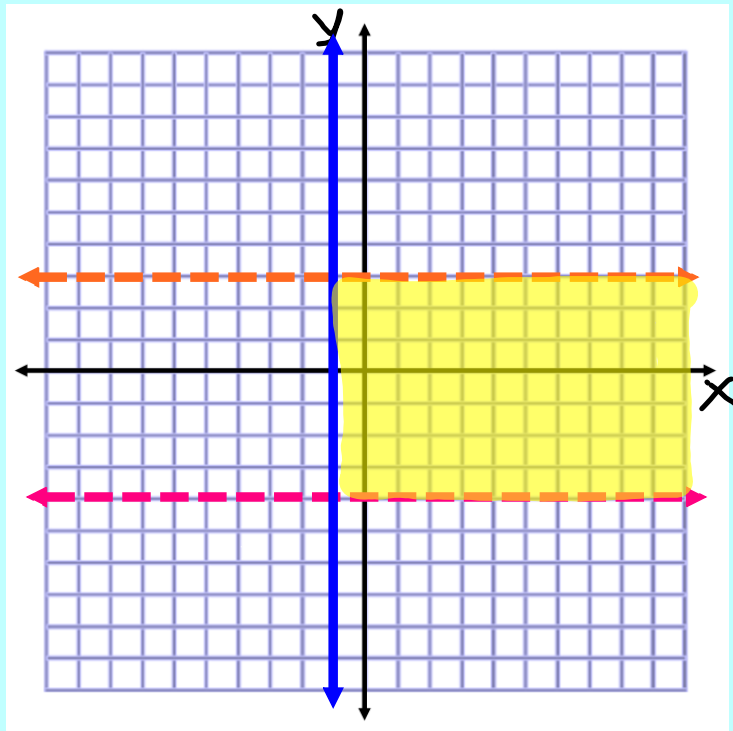
Example 7

Graph the system.

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

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

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

Example 8

Graph the system.

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

$$5x - 3y < 3$$

$$x + 3y > -3$$

$$\begin{array}{r} 2x - 3y > -6 \\ -2x \quad -2x \\ \hline -3y > -2x - 6 \\ -3 \quad -3 \quad -3 \\ \hline y < \frac{2}{3}x + 2 \end{array}$$

$$\begin{array}{r} 5x - 3y < 3 \\ -5x \quad -5x \\ \hline -3y < -5x + 3 \\ -3 \quad -3 \quad -3 \\ \hline y > \frac{5}{3}x - 1 \end{array}$$

$$\begin{array}{r} x + 3y > -3 \\ -x \quad -x \\ \hline 3y > -x - 3 \\ \frac{3y}{3} > \frac{-x-3}{3} \\ y > -\frac{1}{3}x - 1 \end{array}$$

$$\frac{3y}{3} > \frac{-x-3}{3}$$

$$y > -\frac{1}{3}x - 1$$

