

6.3 Graphing Systems of Linear Inequalities

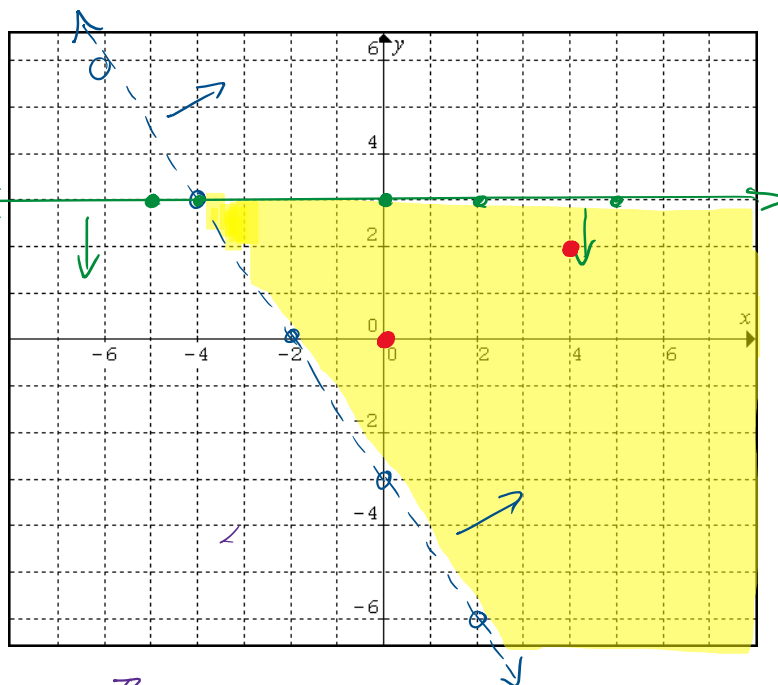
To graph a system of linear inequalities:

1. Graph each inequality as before. Pay attention to solid or dashed lines and restrictions on the domain.
2. Clearly indicate the solution set. This is the region on the grid where the shaded sections overlap.
3. If the shaded sections do not overlap, there is no solution.

Example 1: Graph the solution set for the following system of inequalities. Choose two possible solutions from the set.

$$\begin{array}{l}
 3x + 2y > -6 \quad -3x \\
 -6x \quad \frac{2y}{2} > \frac{-3x-6}{2} \\
 y > -\frac{3}{2}x - 3 \\
 y \leq 3 \\
 y\text{-int} = 3 \\
 m = 0 \\
 \text{"horizontal line"}
 \end{array}$$

Two possible solutions
 $(0, 0)$ $(4, 2)$



How would the solution region change if $x \in I, y \in I$? How would it stay the same?

Dots replace shaded region

Solution set region remains the same.

Example 2: Graph the solution set for the following system of inequalities. Choose two possible solutions from the set.

$$x + 5 \leq y$$

$$x \in W, y \in W$$

$$x + y < 20$$

$$x \in W, y \in W$$

$$x + 5 \leq y$$

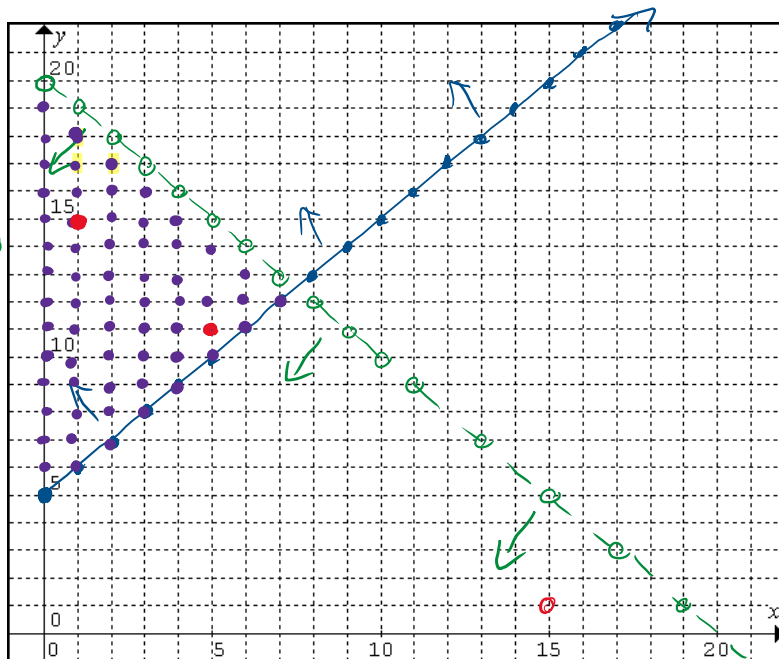
$$y \geq x + 5$$

$$x + y < 20 - x$$

$$-x$$

$$y < -x + 20$$

Two possible Solutions.
 (5, 11) (1, 15)



Example 3: A sloop is a sailboat with two sails: a mainsail and a jib.

When a sail is fully out or up, it is said to be "out 100%". When the winds are high, sailor often reef, or pull in, the sails to be less than their full capability. Jim is sailing in winds of 22 knots, so he wants no more than 80% of the mainsail out. He also wants more mainsail than jib. What possible combinations of mainsail and jib can Jim have out?



$x = \% \text{ of Mainsail out}$ $y = \% \text{ of Jib out}$

$$x \leq 80$$

Vertical line
 filled dots
 solid line

$$x \in \mathbb{R}$$

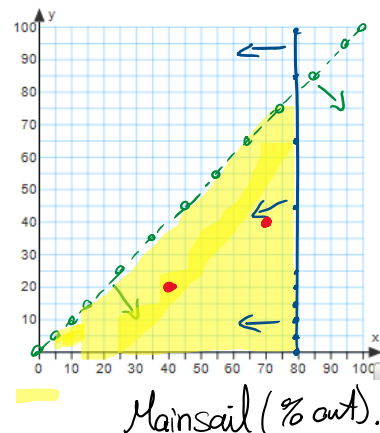
$$0 \leq x \leq 100$$

$$x > y$$

$$y < x$$

Open dot
 dashed line
 $m = \frac{1}{1}$
 $y\text{-int} = 0$

jib
 (% out)



Possible solutions

(40, 20) (70, 40)

Example

To raise money, Athletics is selling 500 T-shirts. The T-shirts are red or blue. Based on previous years' sales, they expect to see at least twice as many blue as red T-shirts.

Write a system of linear inequalities to represent this situation.

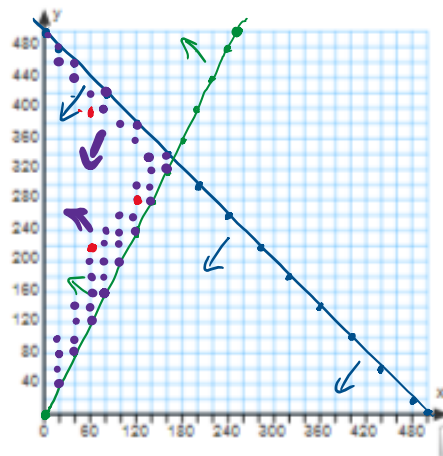
let x = red shirts y = blue shirts.

$$\begin{aligned} x + y &\leq 500 \\ y &\leq -x + 500 \end{aligned}$$

$$\begin{aligned} y &\geq 2x \\ y &\geq 2x \end{aligned}$$

Graph the system.

$x \in \mathbb{W}, y \in \mathbb{W}$
(Whole #'s only).



What are 3 possible solutions to this situation?

$(60, 220)$ $(120, 280)$
 $(60, 400)$

Page 317: ~~3~~, 4, 6-8, 10, ~~11~~

→ #6 + 8 systems for both,
graph for 1.