

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.

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

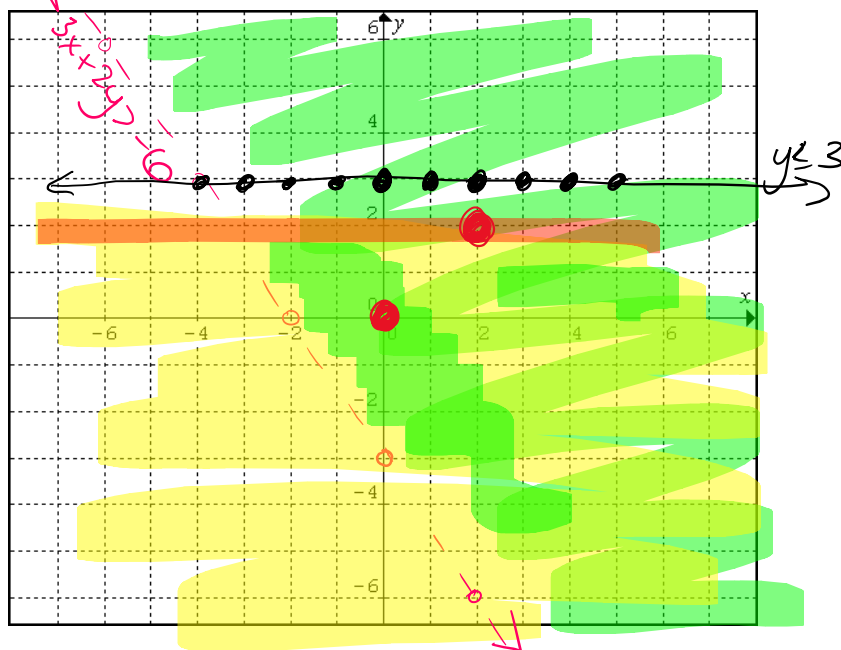
dashed

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

$$y > -\frac{3}{2}x - 3$$

$$y \leq 3$$

solid



possible
Solutions

$$(0, 0), (2, 2)$$

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

- Everything would appear as dots instead of shading, couldn't connect $y \leq 3$ line
- Same areas would be covered

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

$$x + 5 \leq y$$

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

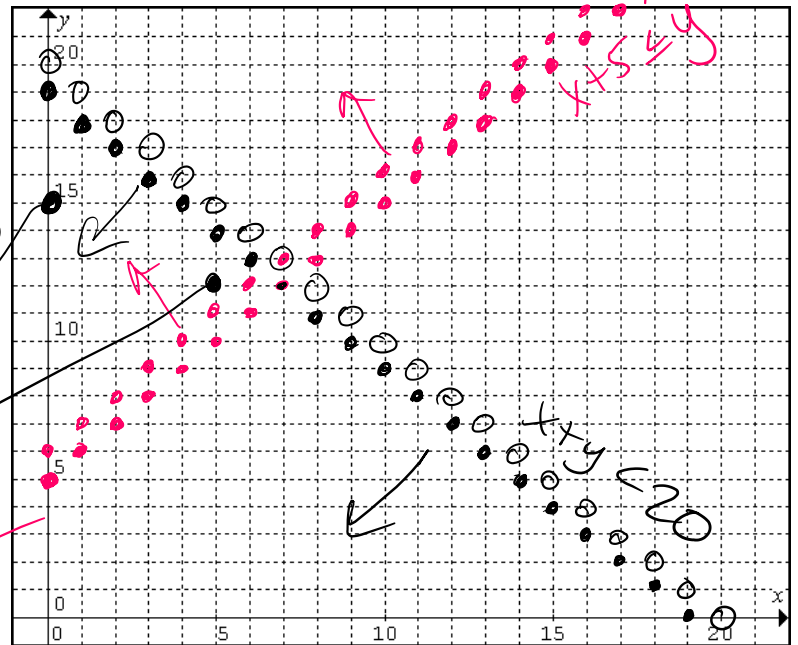
$$x + y < 20$$

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

$$y < -x + 20$$

Possible Solution
(0, 15)

(5, 12)



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?



m : amount of mainsail

j : amount of jib

$$m \leq 80$$

↳ solid

$$m > j$$

↳ dashed

continuous data
shaded area

restriction
 $m, j \geq 0$

Possible solutions

20% jib

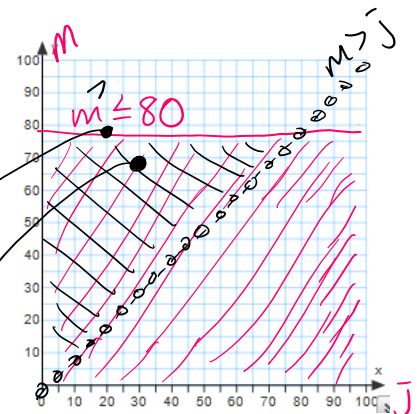
80% mainsail

(20, 80)

30% jib

70% mainsail

(30, 70)



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.

r : # of red shirts
 b : # of blue shirts

$$r + b \leq 500$$

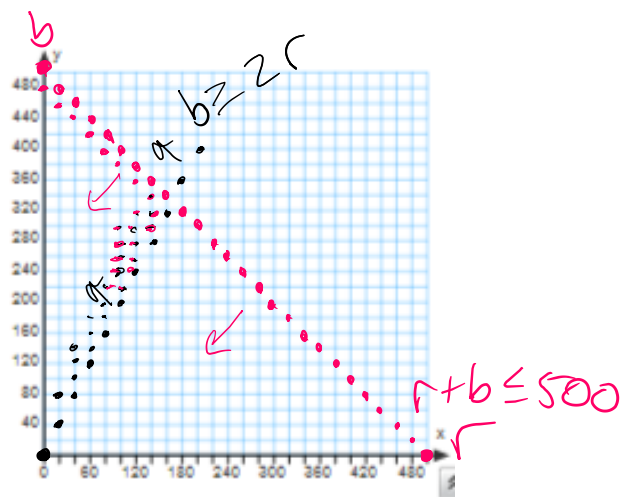
$$b \geq 2r$$

↳ closed dots

Graph the system.

$r, b \in \mathbb{W}$

discrete
stippled



What are 3 possible solutions to this situation?

320 blue 0 red 2 blue 1 red

480 blue, 10 red.