# Linear Inequalities Lesson 2 (With text assignment)

**Chapter 5 – Systems of Linear Inequalities**
**Section 5.3 Graphing to Solve Systems of Linear Inequalities**

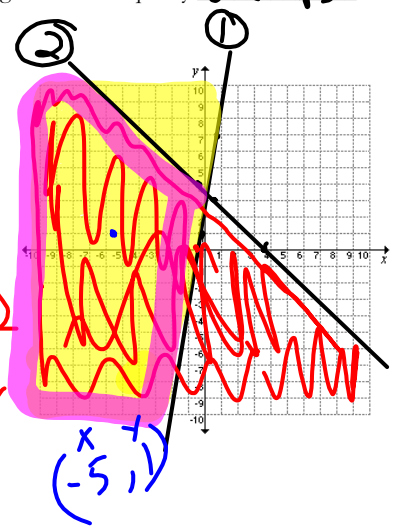
*RF1: Model and solve problems that involve systems of linear inequalities in two variables.*

For a system of linear **equations**, the solution is the point where the two lines intersect. (NRF10)
For a system of linear **inequalities**, the solution is where the shading for each inequality overlaps.

Example 1: Solve the systems of inequalities by graphing.

1) $y \geq 6x + 1$
2) $x + y \leq 4$

What are two possible solutions to this system? Prove one of them.



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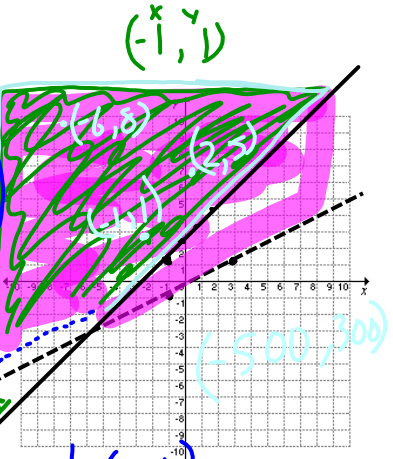


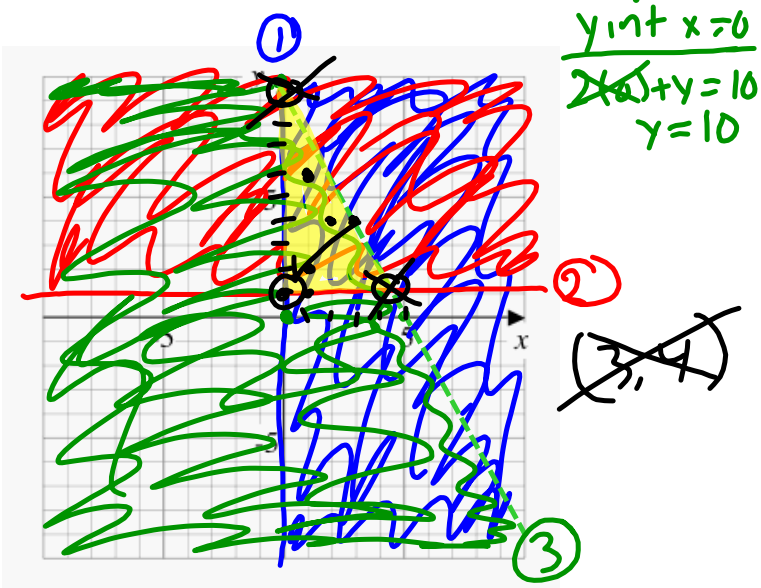
Graph the region defined by these inequalities:

1. $x \geq 0$
2. $y \geq 1$
3. $2x + y < 10$

x int (y = 0)

$\frac{2x}{2} = \frac{10}{2}$

x = 5




y int x = 0

2(0) + y = 10

y = 10

What are three solutions to this system?

(1, 2)

(1, 1)

(2, 3)

(0, 1)

(3, 4)

Is the point of intersection part of the solution set?

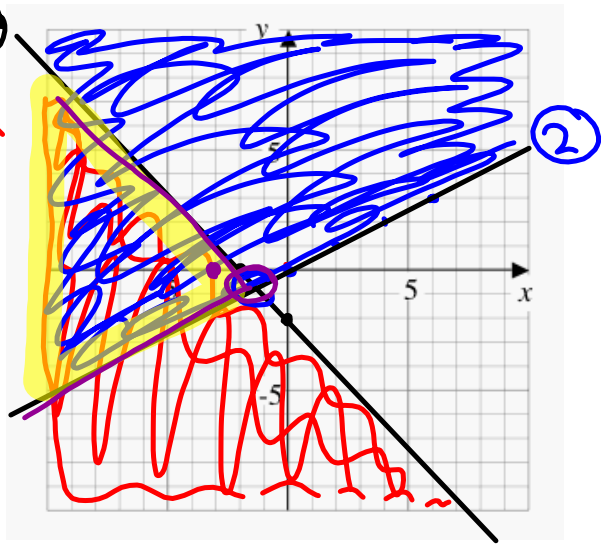
Graph the following system.

$0+0 \leq -2$

$0 \leq -2$ X

① $\{(x, y) \mid x + y \leq -2, x \in I, y \in I\}$

② $\{(x, y) \mid 2y \geq x, x \in I, y \in I\}$




x int

$y = -2$

y int

$y = -2$

$2y \geq x$

$\frac{2y}{2} = \frac{1x}{2}$

$y = \frac{1}{2}x$

② $2y \geq x$

$2(0) \geq -3$

$0 \geq -3$ ✓

a) Give one solution and verify it.

$(-3, 0)$

① $x + y \leq -2$

$(-3) + (0) \leq -2$

$-3 \leq -2$ ✓

b) Are the boundry lines and point of intersection part of the solution set?

To raise funds to buy new instruments, the band committee has 500 t-shirts to sell. The shirts come in red or blue. Based on sales of the same t-shirts at a fundraiser last year, the committee expects to sell at least twice as many blue t-shirts as red t-shirts.

x - Red
y - blue

① $x + y \leq 500$ → $y \leq -\frac{1}{1}x + 500$

② $2x \leq y$

a. Define the variables and restrictions. Write a system of linear inequalities that models the situation.

$x + y \leq 500$ and $y \geq 2x$

$\{x,y \mid x + y \leq 500, x \in W, y \in W\}$

$\{x,y \mid y \geq 2x, x \in W, y \in W\}$

b. Graph the system of inequalities.

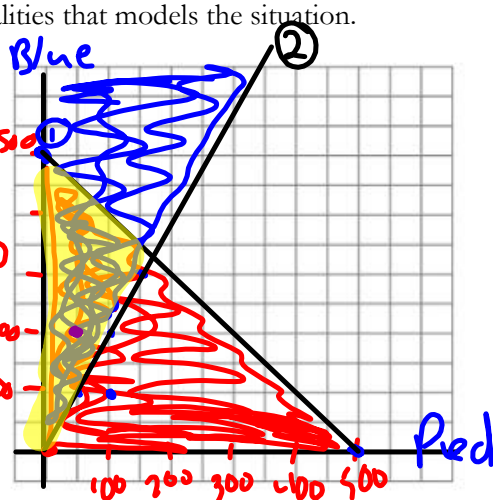
① x int: $x = 500$ (500, 0)

y int: $y = 500$ (0, 500)

② $2x \leq y$

$y = 2x + 0$

100
50




c. Suggest a combination of t-shirt sales that could be made.

② Test (100, 100)

$2x \leq y$

$2(100) \leq 100$

$200 \leq 100$ ✗

① Test (0, 0)

$x + y \leq 500$

$0 + 0 \leq 500$

$0 \leq 500$ ✓

Solution

(50, 200)
red blue

50 red and 200 blue.

Assignment Pg. 235-7 #2, 4 bd, and 8

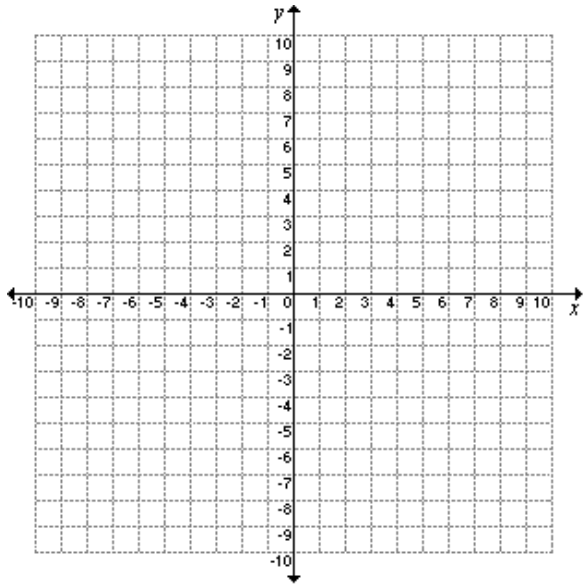
**2.** **a)** Graph the solution set for this system of inequalities. Determine a solution. Check its validity. Describe the solution region.

$x \leq 6$

$3y - x < 6$

**b)** Determine if each point is in the solution region.

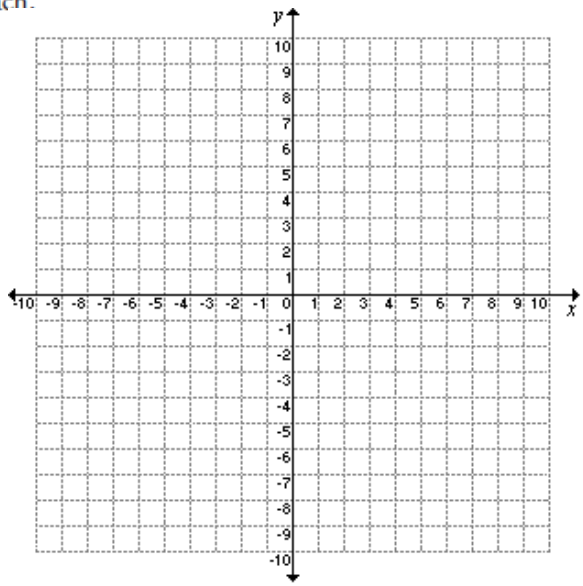
**i)** (6, 4) **ii)** (8, 2) **iii)** (3, 2) **iv)** (3, 3)



**4.** Graph each system. Determine a solution for each.

**b)** $\{(x, y) \mid 2x + y > 0, x \in W, y \in W\}$

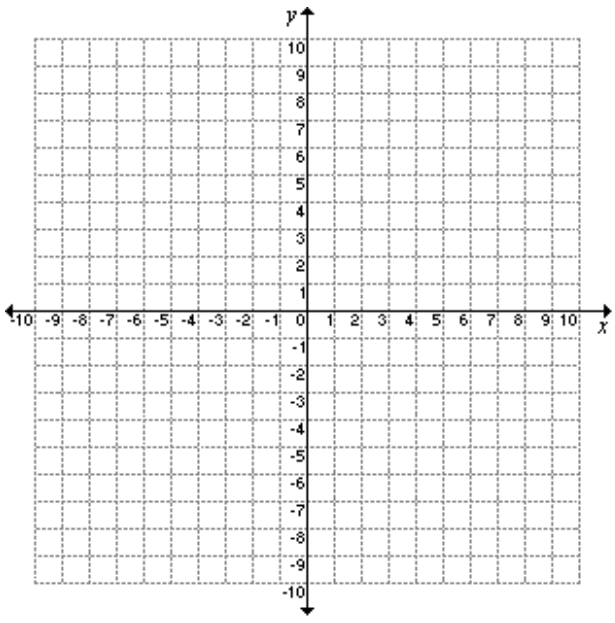
$\{(x, y) \mid y > x, x \in W, y \in W\}$



**4.** Graph each system. Determine a solution for each.

**d)** $\{(x, y) \mid y - x \geq 3, x \in R, y \in R\}$

$\{(x, y) \mid y + 2 \leq x, x \in R, y \in R\}$



8. Trish is setting up her social networking page:
   - She wants to have no more than 500 friends on her new social networking page.
   - She also wants to have at least three school friends for every rugby friend.

   a) Define the variables and write a system of inequalities that models this situation.
   b) Describe the restrictions on the domain and range of the variables.
   c) Graph the solution set to determine two possible combinations of school friends and rugby friends she could have.