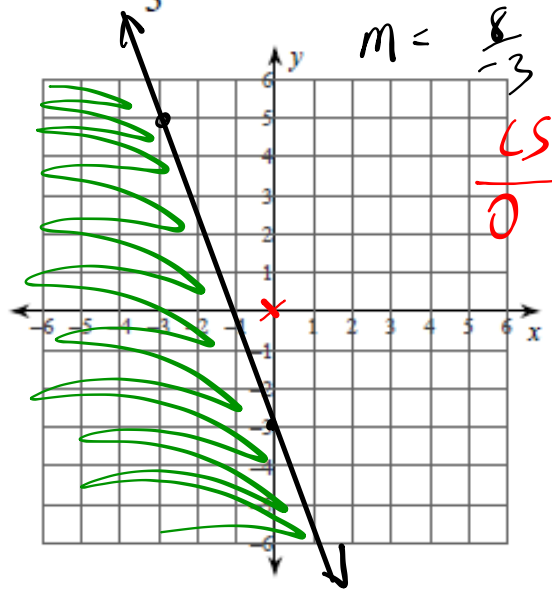
WARM-UP: Graph each of the following...

1) $y \leq -\frac{8}{3}x - 3$



$m = -\frac{8}{3}$

$m = \frac{8}{-3}$

Test (0,0)

LS ≤ RS

0 | $\frac{-8(0)}{3} - 3$

≤ | −3

N

$2x + 5y - 20 > 0$

Test (0,0)

LS > RS

$2(0) + 5(0) - 20 \mid 0$

$-20 > 0$ No

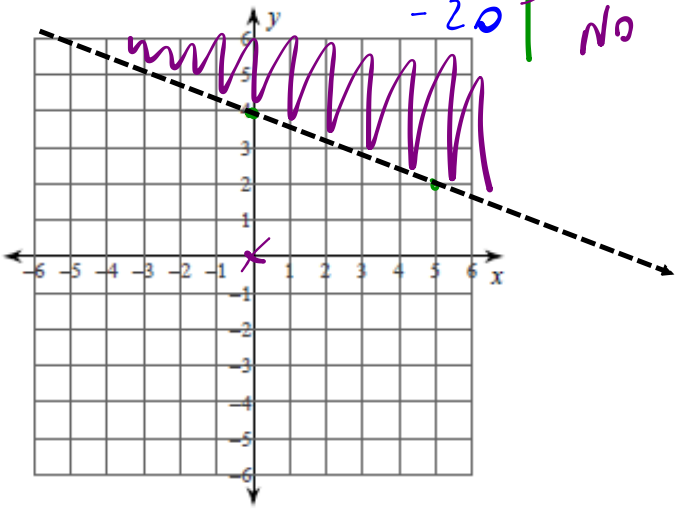
$2x + 5y - 20 = 0$

$5y = -2x + 20$

$\frac{5y}{5} = \frac{-2x}{5} + \frac{20}{5}$

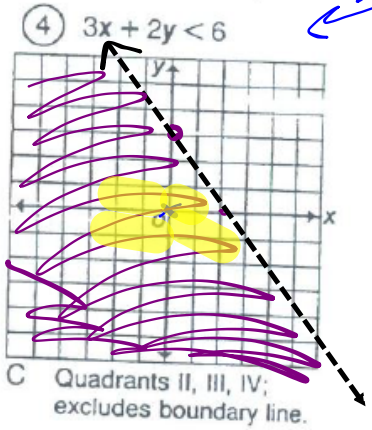
$y = -\frac{2}{5}x + 4$

2)



HOMEWORK Questions...

④ $3x + 2y < 6$



C Quadrants II, III, IV; excludes boundary line.

M Quadrants I, II, IV; includes boundary line.

O All four quadrants; excludes boundary line.

Sub Test (0,0)

$3(0)+2(0) \;|\; 6$

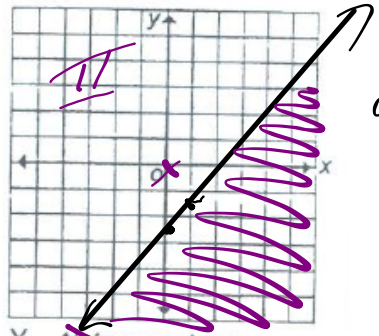
$0 \;|\; 4$ yes

$3x + 2y = 6$

$\frac{2y}{2} = -\frac{3x}{2} + \frac{6}{2}$

$y = -\frac{3}{2}x + 3$

(10) $2(x-y) \geq 5$



Y All four quadrants; excludes boundary line.

U Quadrants II, III, IV; includes boundary line.

A Quadrants I, III, IV; includes boundary line.

LS $\geq$	RS
$2(0-0)$	5
0	$\geq$ No

$2(x-y)=5$

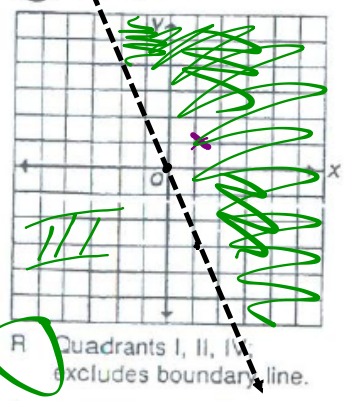
$2x-2y=5$

$-2y=-2x+5$

$\frac{-2y}{-2}=\frac{-2x}{-2}+\frac{5}{-2}$

$y=\frac{1}{1}x-2.5$

⑨ $3x + y > 0$



R Quadrants I, II, IV; excludes boundary line.

L ~~All four quadrants; includes boundary line.~~

M Quadrants I, III, IV; excludes boundary line.

Test (1, 1)

$LS > RS$

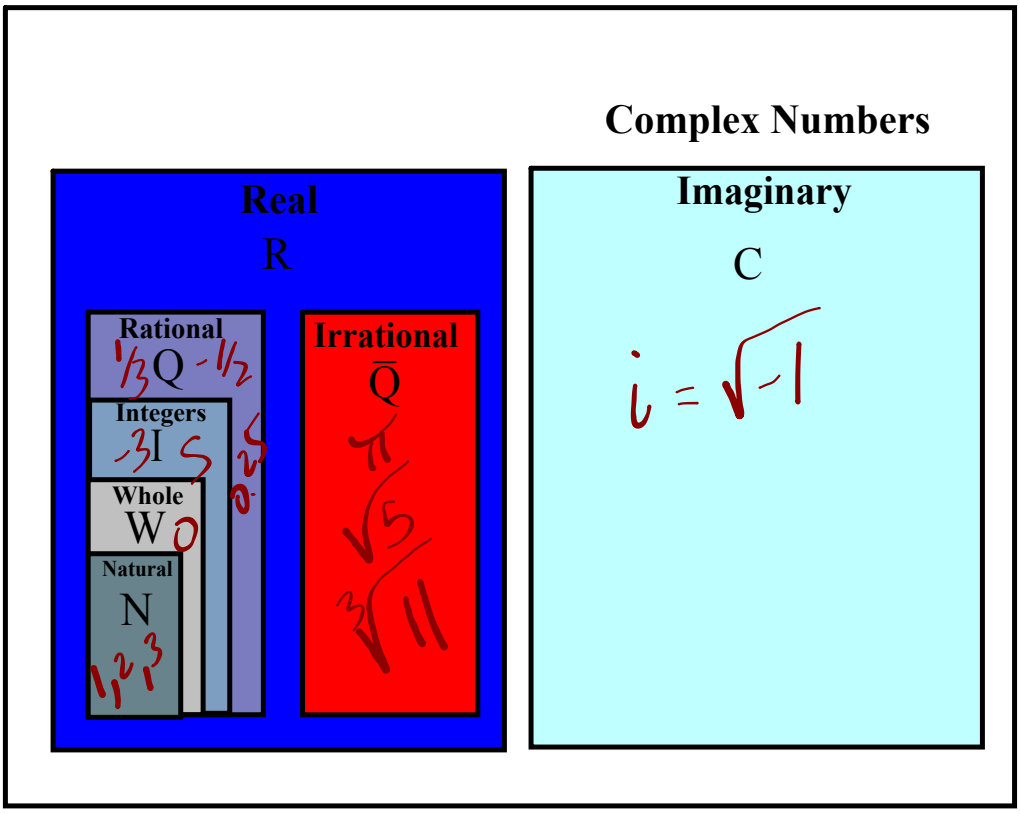
$3(1) + 1$	0
$4 >$	yes

$3x + y = 0$

$y = -3x$

$\frac{y}{1}$

STORYTIME: "The Complete Number System"



5.1 Graphing Linear Inequalities in Two Variables

GOAL

Solve problems by modelling linear inequalities in two variables.

EXPLORE...

- For which inequalities is (3, 1) a possible solution? How do you know?

a) $13 - 3x > 4y$
b) $2y - 5 \leq x$
c) $y + x < 10$
d) $y \geq 9$

sub

VERIFY
LS ? RS

Let's VERIFY...

a) $LS > RS$

$13-3(3)$	$4(1)$
$13-9$	
4	> 4 NO

b) $LS \leq RS$

$2(1)-5$	3
-3	$\leq$ yes

c) $LS < RS$

$1+3$	10
4	$<$ yes

d) $LS \geq RS$

1	≥ 9
	NO

Graphs of Linear In-Equalities

Sometimes the domain and range are stated as being in the set of integers. This means that the solution set is **discrete** and consists of separate or distinct parts. Discrete variables represent things that can be counted, such as people in a room. This means that the solution region is not shaded but rather stippled with points.

So when interpreting the solution region for a linear inequality, consider the restriction on the domain and range of the variables.

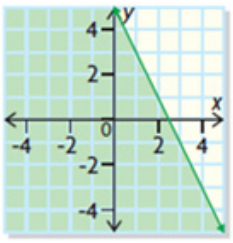
If the solution set is **continuous**, all the points in the solution region are in the solution set. (Shaded)

If the solution set is **discrete**, only specific point in the solution region are in the solution set. This is represented graphically by stippling.

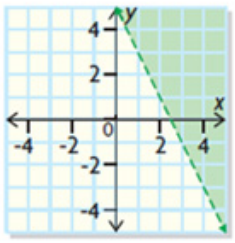
Some solution sets may be restricted to specific quadrants. For example, most linear inequalities representing real-world problem situations have graphs that are restricted to the first quadrant.

Here are some examples:

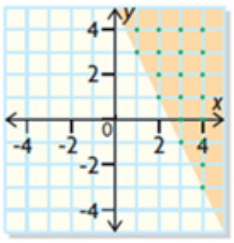
$\{(x, y) \mid y \leq -2x + 5, x \in R, y \in R\}$



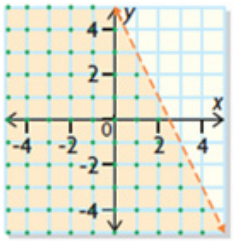
$\{(x, y) \mid y > -2x + 5, x \in R, y \in R\}$



$\{(x, y) \mid y \geq -2x + 5, x \in I, y \in I\}$



$\{(x, y) \mid y < -2x + 5, x \in I, y \in I\}$



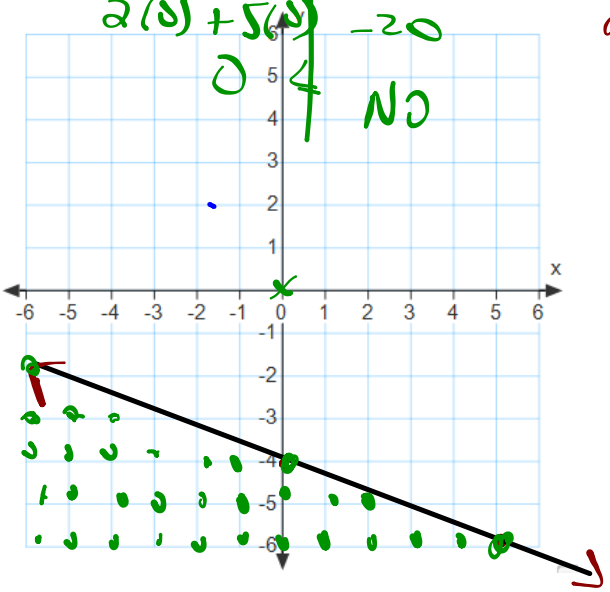
Let's do a couple more...

1) $\{(x,y) \mid 2x+5y \leq -20, x \varepsilon I, y \varepsilon I\}$ → stipple

LS ≤ RS

$2(0)+5(0) \leq -20$

$0 \leq -20$ NO



$2x+5y = -20$

$\frac{5y}{5} = \frac{-2x}{5} - \frac{20}{5}$

$y = -\frac{2}{5}x - 4$

{ } → Set

's

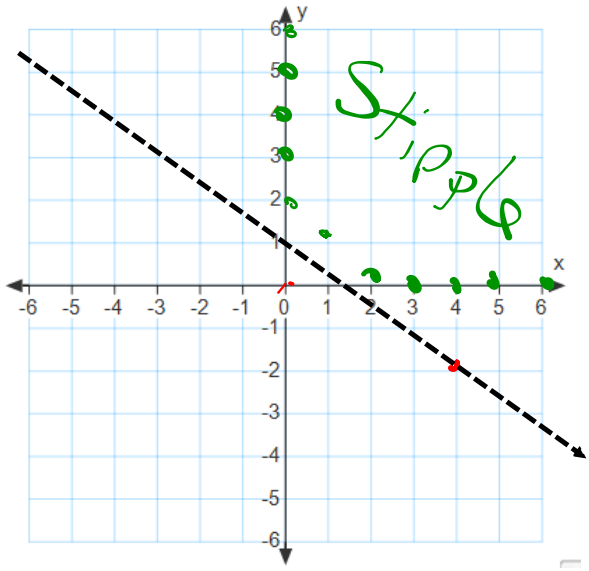
| → such that

ε → belongs to

2) $\{(x,y) \mid 3x+4y>4, x \varepsilon W, y \varepsilon W\}$

dashed

Stipple Q1



$3x+4y=4$

$\frac{4y}{4} = \frac{-3x}{4} + \frac{4}{4}$

$y = -\frac{3}{4}x + 1$

LS > RS

$3(0)+4(0)$	4
0	NO

HOMEWORK... Questions?

p. 221: #1, #2, #4 and #6