

## Linear Inequalities in Two Variables

A **linear inequality** in two variables is an inequality that can be written in one of the following forms:

$$Ax + By < C, \quad Ax + By \leq C, \quad Ax + By > C, \quad Ax + By \geq C$$

An ordered pair  $(x,y)$  is a **solution** of a linear inequality if the **inequality is true** when the values of "x" and "y" are substituted into the inequality. For instance,  $(-6,2)$  is a solution of  $y \geq 3x-9$  because  $2 \geq 3(-6) - 9$  is a true statement.

Check whether the given ordered pair is a solution of  $2x + 3y \geq 5$ .

a)  $(0,1)$

No.

$$2(0) + 3(1) = 5$$

$$\cancel{3 \geq 5}$$

b)  $(4,-1)$

Yes

c)  $(2,1)$

Yes

The **graph** of a linear inequality in two variables is the graph of all solutions of the inequality. The boundary line of the inequality divides the coordinate plane into two **half-planes**: a shaded region which contains the points that are solutions of the inequality, and an unshaded region which contains the points that are not.

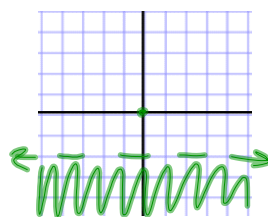
### Graphing A Linear Inequality

The graph of a linear inequality in two variables is a half-plane. To graph a linear inequality, follow these steps:

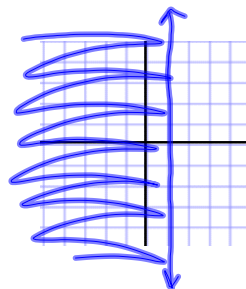
- Step 1: Graph the boundary line of the inequality. Use a **dashed line** for  $<$  or  $>$  and a **solid line** for  $\leq$  or  $\geq$ .
- Step 2: To decide which side of the boundary line to **shade**, **test a point NOT** on the boundary line to see whether it is a solution of the inequality. Then shade the appropriate half-plane.

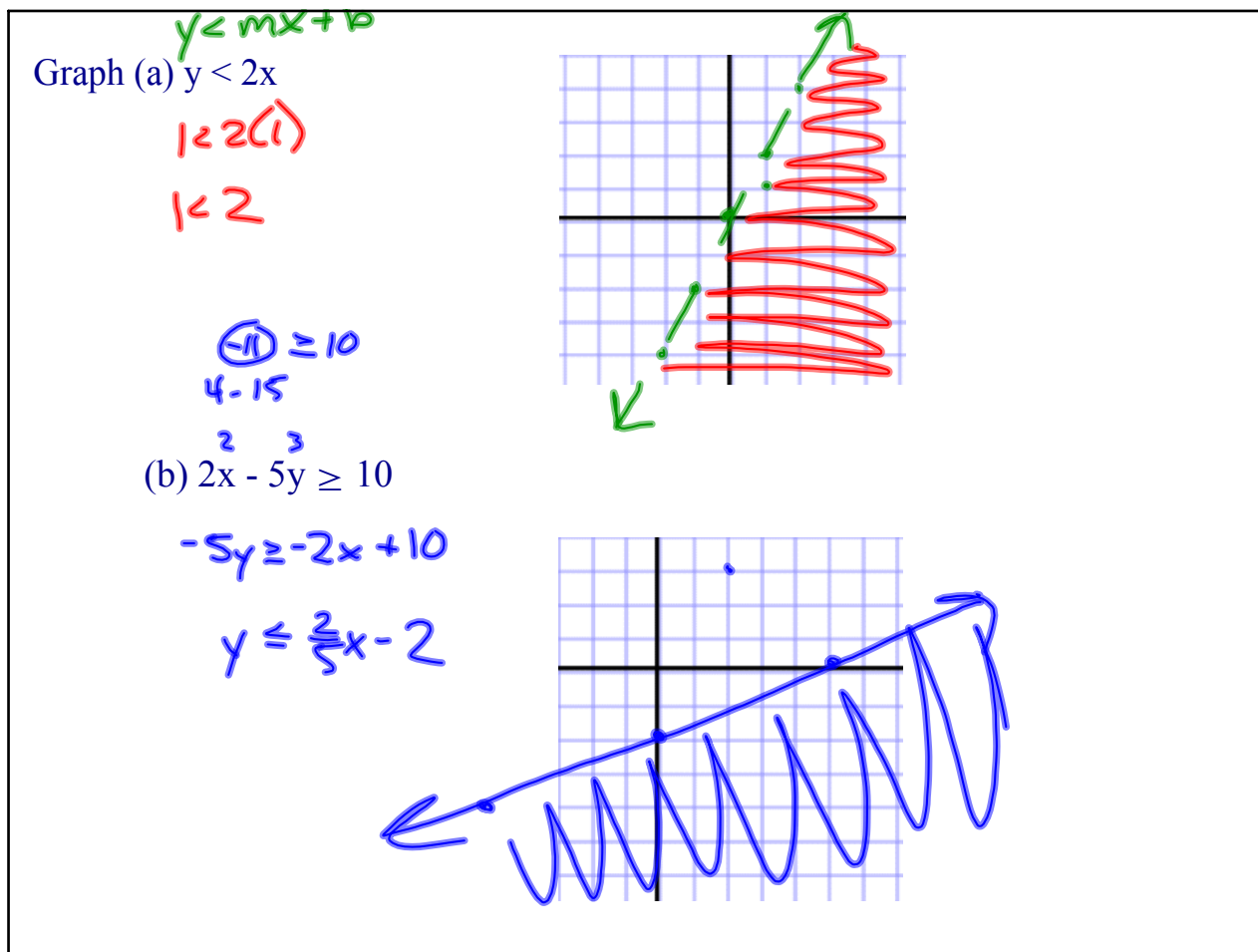
Graph (a)  $y < -2$

$$y < -2$$



(b)  $x \leq 1$





Assignment:

p. 111

# 14-22 even,  
28, 30,  
34-42 even

(Please use graph paper)