Graphing Linear Inequalities

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PRE-CALCULUS 11
INEQUALITIES & SYSTEMS OF EQUATIONS
GRAPHING LINEAR INEQUALITIES

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A. <u>Definitions</u>

    1. **linear inequality:** any linear inequality that can be written in the form:

$$ax + by + c < 0 \quad \text{or} \quad ax + by + c \leq 0$$

$$ax + by + c > 0 \quad \text{or} \quad ax + by + c \geq 0$$

    where a, b, and c are constants

(handwritten) $ax + by + c = 0$

    2. **test point:** a graphical point used to determine the answer to an inequality.
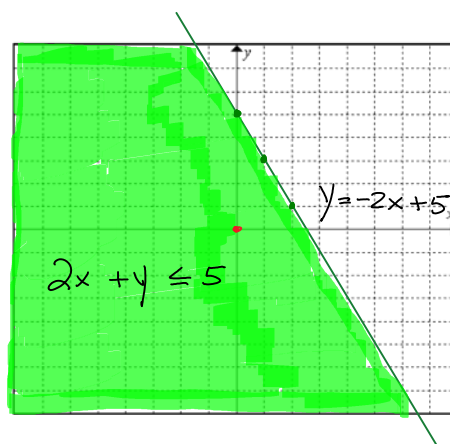
B. <u>Graphing a Linear Inequality</u>

> **Rules**
>
> 1. Graph the inequality as if it was an equation using a **broken line** (> or <) or **solid line** ($\geq$ or $\leq$).
> 2. Use a test point like (0, 0) on one side of the line to determine which side of the line contains all of the acceptable answers that satisfy the inequality.

Graph the following inequalities.

1. $2x + y \leq 5$ *(handwritten: — Solid line.)*

(handwritten work:)

$$2x + y = 5$$
$$-2x \qquad \qquad -2x$$
$$y = -2x + 5$$

$$2x + y \leq 5$$
$$2(0) + (0) \leq 5$$
$$0 \leq 5$$
$$\text{True}$$

(handwritten on graph:) $y = -2x + 5$ $2x + y \leq 5$

2. $x - 2y > 4$ ← broken line.

$$\cancel{x} - 2y = 4$$
$$-x \qquad -x$$

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

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

$$x - 2y > 4$$
$$(0) - 2(0) > 4$$
$$0 > 4$$
False.

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

$x - 2y > 4$
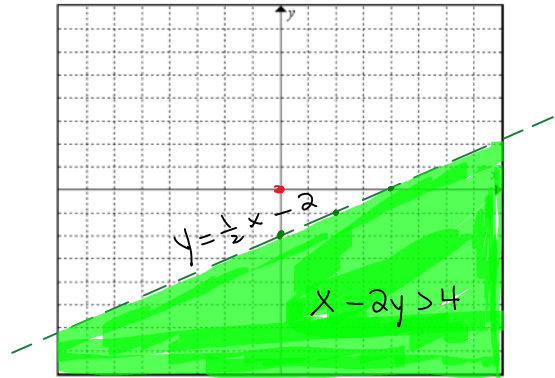
3. $x \le 2$ ← Solid line

$$x = 2$$

$$x \le 2$$
$$(0) \le 2$$
$$0 \le 2$$
True.

$x \le 2$ $\qquad x = 2.$
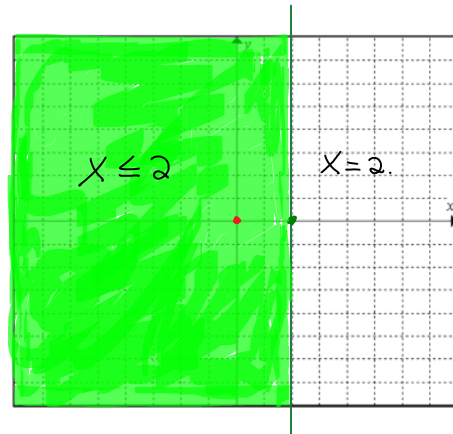
4. $y > -3$ ← broken line

$$y = -3$$

$$y > -3$$
$$(0) > -3$$
$$0 > -3$$
True.

$y > -3$

$y = -3$
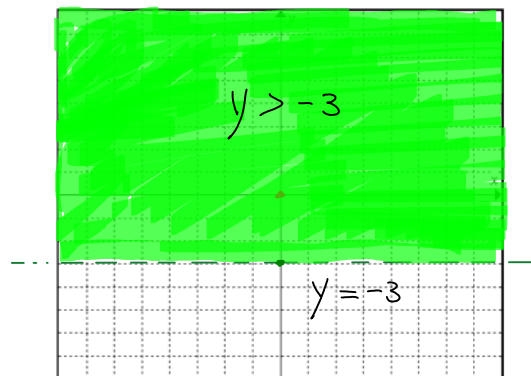
5. Graph the inequality for the given restrictions on the variables.

broken line

$y > -2x - 4;$ for $x < 0, \ y < 0$

$y = -2x - 4$

$y > -2x - 4$

$(0) > -2(0) - 4$

$0 > -4$

True.

$y > -2x - 4$
$x < 0, y < 0$

$y = -2x - 4$
$x < 0, y < 0$
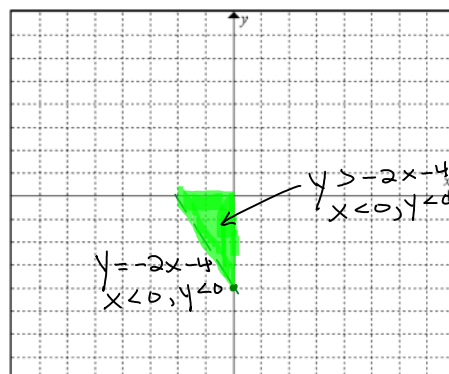
6. Write an inequality to describe the graph.

Y-int $(0, 3)$ slope $= \dfrac{-3}{2}$

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

$y \ \boxed{} \ -\dfrac{3}{2}x + 3$

$(0) \ \boxed{} \ -\dfrac{3}{2}(0) + 3$

$0 \ \boxed{\geq} \ 3$

false

$$\boxed{y \geq -\dfrac{3}{2}x + 3}$$

false -3

2

Solid line

Assignment: Pg. 360 #3 – 8, 13