Pre-Calculus 11 Graphing Linear Inequalities in 2 Variables

Recall:

Identify the slope, y-intercept, and x-intercept of the graph of each line.

$y = \frac{2}{3}x - 5$

$y = mx + b$; slope ; y-int

slope $\frac{2}{3}$; y-int -5

x-int

Set $y = 0$

$0 = \frac{2}{3}x - 5$

$5 = \frac{2}{3}x$

$15 = 2x$

$\frac{15}{2} = x$

$3x + 2y + 9 = 0$

$2y = -3x - 9$

$y = -\frac{3}{2}x - \frac{9}{2}$

slope $-\frac{3}{2}$; y-int $-\frac{9}{2}$

x-int

$3x + 2(0) + 9 = 0$

$3x = -9$

$x = -3$

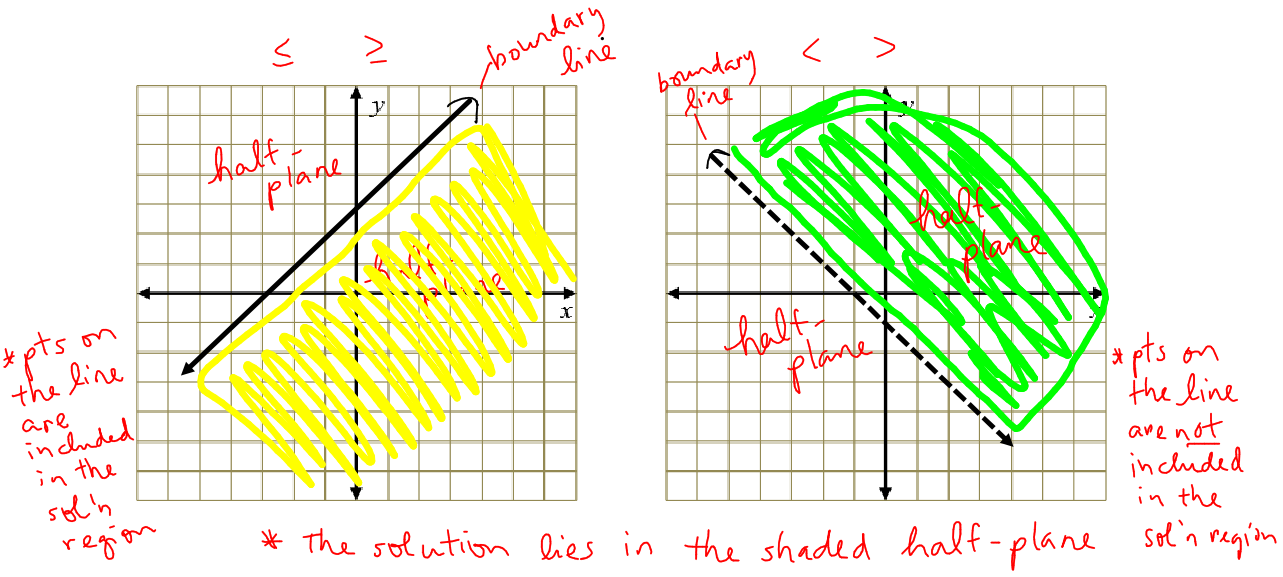
Steps to Graphing Linear Inequalities

1. Graph the equation using $y = mx + b$
   - Use a dotted/dashed line if original is $< or >$
   - Use a solid line if original is $\leq or \geq$
2. Determine which side to shade
   - Choose a test point NOT on the line and substitute into original inequality
     - If TRUE, shade side containing the point
     - If FALSE, shade opposite side (NOT containing the point)

Note:

- (0, 0) is the easiest test point to use, unless the graph goes through it
- The resulting graph will be a half-plane

The graph of a line separates the graph into 3 distinct regions.



* the solution lies in the shaded half-plane

Ex.1) Graph each of the following:

a.) $y \leq -2x + 4$

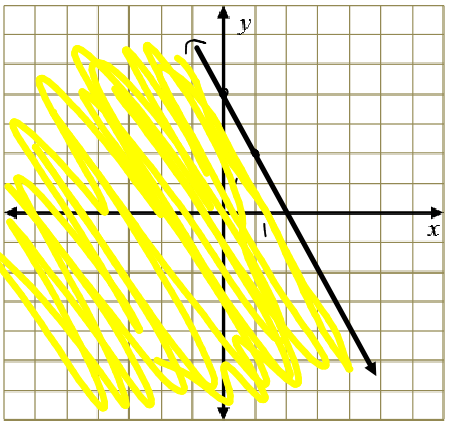
① Graph $y = -2x + 4$

Plot y-int @ 4

use slope to get a 2nd point

$\frac{-2}{1}$ down 2, right 1

use a solid line



② Test a point from either half-plane (usually (0,0))

$y \leq -2x + 4$

$0 \leq -2(0) + 4$?

$0 \leq 4$?

True ∴ shade half-plane where (0,0) lies

b.) $3x - y > 3$

$3x - y = 3$

$3x - 3 = y$

Use a broken line

Test pt (0, 0)

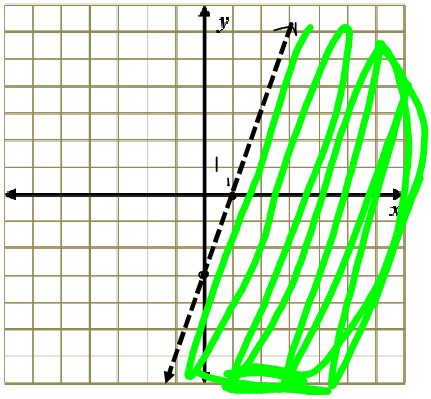
$3x - y > 3$

$3(0) - 0 > 3$?

$0 > 3$?

False

∴ shade the opposite half-plane



c.) $2x - 3y \geq 6$

$2x - 3y = 6$

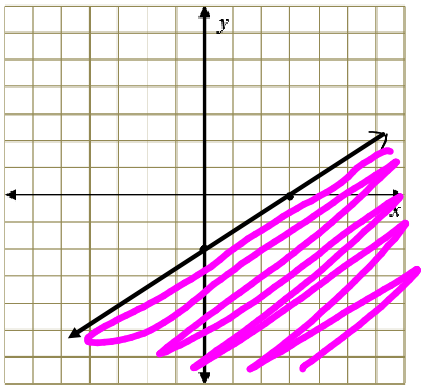
$2x - 6 = 3y$

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

$2(0) - 3(0) \geq 6$

$0 \geq 6$?

False



d.) $y - 3 > 0$

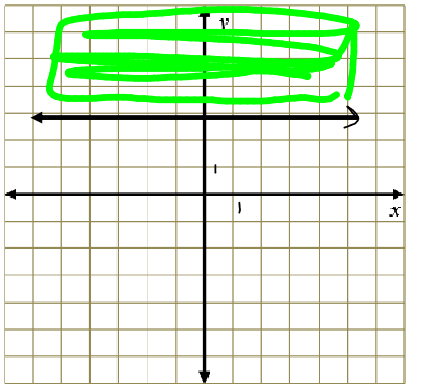
$y - 3 = 0$

$y = 3$

$0 - 3 \geq 0$

$-3 \geq 0$?

False



pg. 360
#3c, 4
5a, c
6c, d
7a, c
8b