

## Mini-Lecture 1.8

### Linear Inequalities in Two Variables

#### **Learning Objectives:**

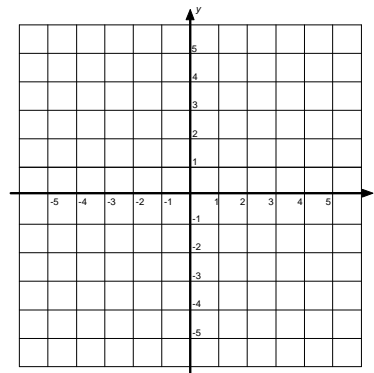
1. Determine whether an ordered pair is a solution to a linear inequality.
2. Graph linear inequalities.
3. Solve problems involving linear inequalities.

#### **Preparing for Linear Inequalities in Two Variables:**

i) Determine whether  $x = 2$  satisfies the inequality:  $-4x + 3 \leq -3$ .

ii) Solve the inequality:  $4x + 1 \geq 8x - 3$ .

iii) Graph the linear equation:  $-10x + 2y = -5$ .



#### **Examples:**

1. Determine whether the given points are solutions to the linear inequality:  $5x - 2y < -3$ .

a)  $(-2, 3)$

b)  $(1, 4)$

c)  $(-2, -4)$

## Steps for Graphing a Linear Inequality in Two Variables

**Step 1:** Replace the inequality symbol with an equal sign and graph the resulting equation. If the inequality is strict ( $<$  or  $>$ ), use dashes to graph the line; if the inequality is nonstrict ( $\leq$  or  $\geq$ ) use a solid line. The graph separates the  $xy$ -plane into two half-planes.

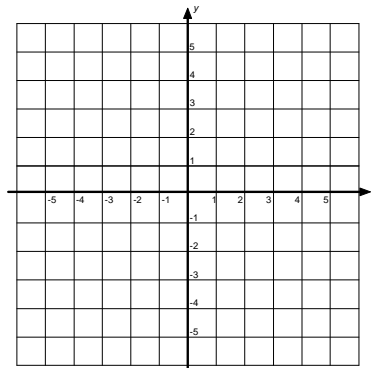
**Step 2:** Select a test point  $P$  that is not on the line (that is, select a test point in one of the half-planes).

(a) If the coordinates of  $P$  satisfy the inequality, then shade the half-plane containing  $P$ .

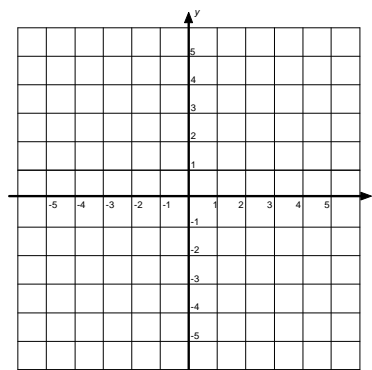
(b) If the coordinates of  $P$  do not satisfy the inequality, then shade the half-plane that does not contain  $P$ .

2. Graph each linear inequality.

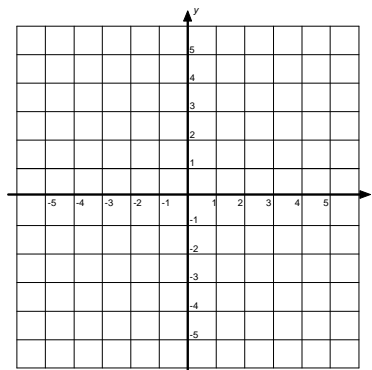
a)  $y < -2x - 3$



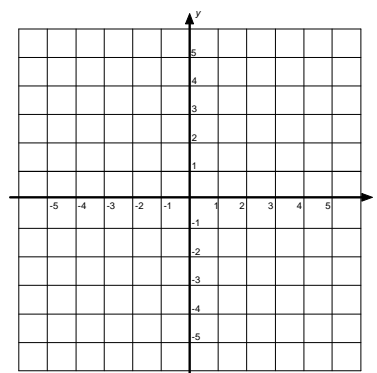
b)  $3x + 4y \leq 12$



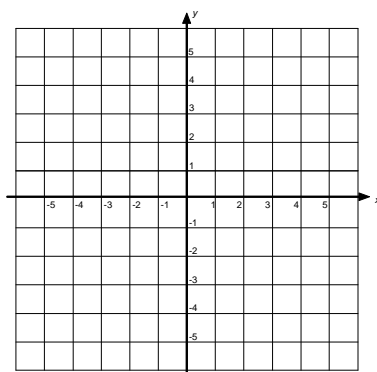
c)  $4x - y \geq -4$



d)  $-5x + 3y > 15$



e)  $x \geq -2$



f)  $y < 3$

