Chapter 4 Section 4
Linear Inequalities in Two Variables

Linear Inequalities in Two Variables and Their Solutions.

A solution of an inequality in two variables, x and y, is an ordered pair of real numbers.
When the ordered pair is substituted into the inequality, the result is a true statement.
Example:
    x + y ≥ 1   solution (3, 2) since when the ordered pair is substituted into the
inequality, 3 + 2 ≥ 1 is true.
Because there are many solutions that make this inequality true, there are infinitely many
solutions.

The Graph of Linear Inequality in Two Variables.
The graph of an inequality in two variables is the set of all points whose coordinates satisfy the
inequality. The solution will be a region.

Example 1: page 288
Graph: 2x – 3y ≥ 6

Solution:
    1) Replace the inequality symbol with an equal sign.
    2) Graph the line
    3) Pick a point either above or below the line
    4) Substitute the ordered pair into the original inequality.
    5) True, shade that region. False, shade the other region.

Note: ≥ and > are different.

Example 2: page 289
Graph: $y > \dfrac{2}{3}x$

Example 3: page 290
a) y ≤ -3   b) x > 2

Graph:
-2 ≤ x < 4

System of Linear Inequalities.
A solution of a system of linear inequalities in two variables is the set of all ordered pairs that satisfies each inequality in the system.

Example 5: page 292

Graph the solution set of the system: $\begin{cases} x - y < 1 \\ 2x + 3y \geq 12 \end{cases}$

Example 6: page 293
Graph the solution set of the system:

$$\begin{cases} x - y < 2 \\ -2 \leq x < 4 \\ \quad y < 3 \end{cases}$$