A system of linear inequalities in two variables, or simply a system of linear inequalities, consists of two or more linear inequalities in the same variables. For example:

\[ x - y > 7 \]
\[ 2x + y < 8 \]

The solution of a system of inequalities is an ordered pair that is a solution of each inequality in the system.

**Example 1:** Is (3, -5) a solution to the system of inequalities above?
How about (5, -2)?

**Example 2:** Solve the following system of inequalities by graphing:

\[ 3x + 2y \leq 6 \]
\[ x < 2 \]
Example 3:

Solve the following system of inequalities by graphing:

\[ y \geq -1 \]
\[ x > -2 \]
\[ x + 2y \leq 4 \]

Example 4:

Is (0, -1) a solution to the following system of inequalities?

What about (2, -2)?

What about (2, -5)?

What about (3, 0)?

Example 5:

\[ y > \frac{1}{2}x + 1 \]
\[ y \leq \frac{1}{2}x - 2 \]
Solve each system of inequalities by graphing!

1) \[ y \geq -3x - 2 \]
\[ y < x + 2 \]

2) \[ y \geq -\frac{1}{2}x - 2 \]
\[ y < -\frac{5}{2}x + 2 \]

3) \[ y \geq 1 \]
\[ y \geq x - 1 \]

4) \[ y \leq x - 1 \]
\[ x \leq 3 \]
5) \( x - 2y \geq 2 \)
\( x - 2y < -4 \)

6) \( 5x + 3y > -9 \)
\( x + 3y \leq 3 \)

7) \( y \leq \frac{-5}{4}x - 8 \)
\( y < \frac{-5}{4}x + 2 \)

8) \( y \leq \frac{8}{7}x + 7 \)
\( y \geq \frac{8}{7}x + 2 \)

9) Is \((0, 7)\) a solution to question number 8 above?
1. Solve the following system of inequalities.

\[ y \geq -2 \]
\[ 2x + 3y > -6 \]

2. Is the point (0, -2) a solution of this system?
3. **ALGEBUSINESS** Sully receives a 40 dollar gift certificate for the jewelry shop *Brust’s Algebling*. An *Algebracelet* costs $5 while a *Calcunecklus* costs $8. Sully wants at least one of each.

Let \( a = \text{the number of Algebracelets} \) and \( c = \text{the number of Calcuneckluses} \)

a. Tell what each of the following inequalities means in the context of this problem:

\[ a \geq 1 \]
\[ c \geq 1 \]
\[ 5a + 8c \leq 40 \]

b. Graph all 3 inequalities.

(Hint: Solve \( 5a + 8c \leq 40 \) for \( c \) by subtracting \( 5a \) from each side and dividing each term by 8. Your inequality is now very similar to \( y = mx + b \).)

c. Tell one point that is a solution to this system of inequalities.

c. Tell one point that is not a solution to this system of inequalities.

**Coming Up:** Rewrite each using exponents.

1. \( 9 \cdot 9 \cdot 9 = \) ______
   2. \( 1 \cdot 1 \cdot 1 \cdot 1 \cdot 1 \cdot 1 \cdot 1 \cdot 1 \cdot 1 \cdot 1 \cdot 1 \) 
      = ______
   3. \( (xy) \cdot (xy) \cdot (xy) \cdot (xy) = \) _____

**Quick Review:** Find the slope of the line that passes through the given points.

1. \((-2, 3); (-2, 11)\)
2. \((6, 3); (-5, 9)\)
3. \((4, 7/6); (-736, 7/6)\)