

Math 130

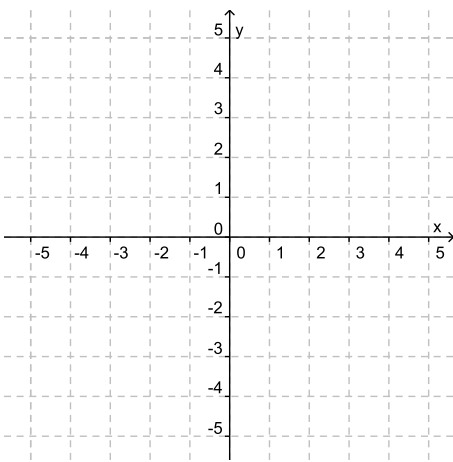
5.6 – Systems of Inequalities and Linear Programming

Solving Linear Inequalities

A **linear inequality in two variables** is of the form $Ax + By \leq C$ (where the \leq could be \geq , $>$, or $<$).

Ex 1.

Graph $3x - 2y \geq 6$.



Systems of Inequalities

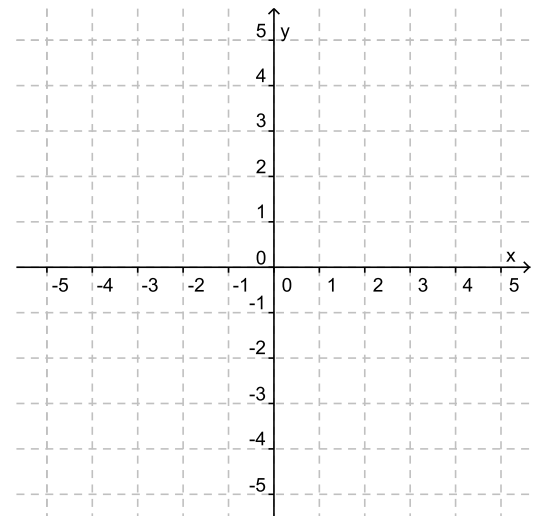
System of inequalities look similar to systems of equations.

Ex 2.

Graph the solution set of the following system.

$$x^2 + y < 4$$

$$x < y - 1$$



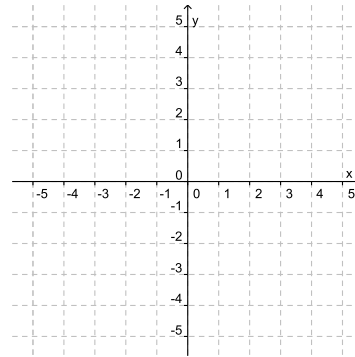
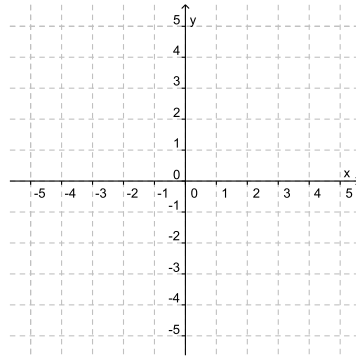
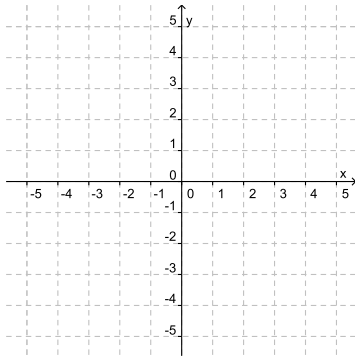
Ex 3.

Graph the solution set of the following system.

$$|y| \leq 1$$

$$x \geq 0$$

$$y > 2|x| + 1$$



Linear Programming

Linear programming is about finding optimum value (like minimum cost or maximum profit).

The function you're trying to optimize is called the **objective function**.

You'll also have a list of **constraints**.

Ex 4.

Bob takes vitamin pills each day. He wants at least 16 units of Vitamin A, at least 5 units of Vitamin B₁, and at least 20 units of Vitamin C. There are two kinds of pills.

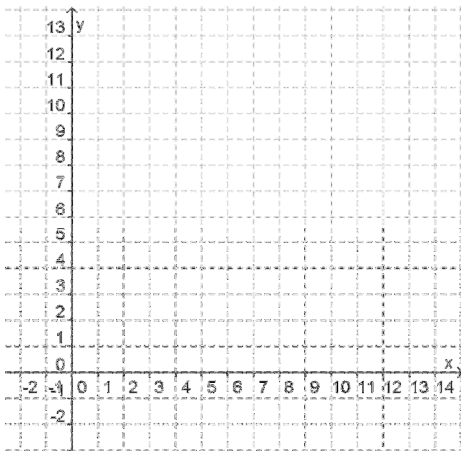
The red pills cost 20¢ each, and contain 8 units of A, 1 of B₁, and 2 of C.

The blue pills cost 10¢ each, and contain 2 units of A, 1 of B₁, and 7 of C.

How many of each pill should he buy to minimize his cost, and yet fulfill his daily needs?

Step 1: Write objective function and all constraints.

Step 2: Graph region of feasible solutions.



Step 3: Identify all vertices or corner points.

Step 4: Find value of objective function at each vertex.

Step 5: Solution is vertex giving the optimal value of objective function.

Q: What can't you keep until you have given it?