

In Grade 10 you studied systems of linear equations in two variables. The solution is the point(s) of intersection of the lines.

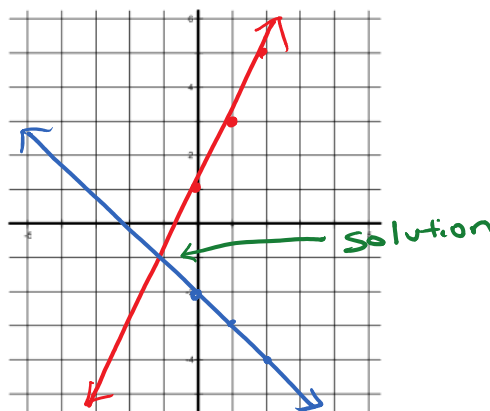
Eg. Solve the linear system by graphing:

$$\begin{aligned} 2x - y &= -1 \\ x + y &= -2 \end{aligned}$$

$$\begin{aligned} 2x - y &= -1 \\ -y &= -2x - 1 \\ y &= 2x + 1 \end{aligned}$$

$$\begin{aligned} x + y &= -2 \\ x + y &= -2 \\ y &= -x - 2 \end{aligned}$$

Solution
 $(-1, -1)$



Here, we look at systems of linear **inequalities**. The solution is the region where the corresponding half-planes intersect or overlap.

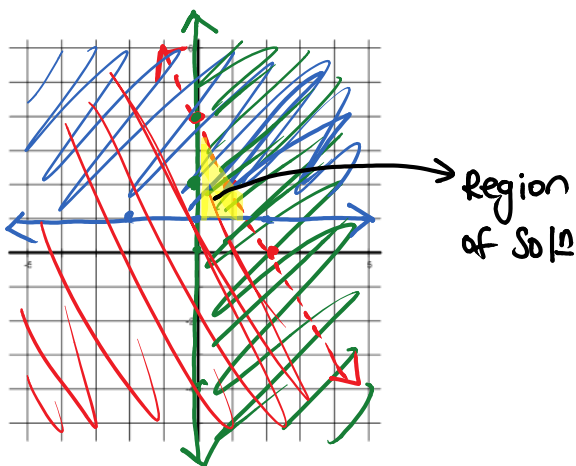
Eg. Graph the region defined by these inequalities:

$$\begin{aligned} x &\geq 0 \\ y &\geq 1 \\ 2x + y &< 4 \end{aligned}$$

$$\begin{aligned} 2x + y &= 4 \\ y &= -2x + 4 \end{aligned}$$

Test pt $(-1, -1)$

$$\begin{aligned} 2(-1) + (-1) &< 4 \\ -2 + (-1) &< 4 \\ -3 &< 4 \quad \checkmark \end{aligned}$$



Example 1: A sporting goods manufacturer makes footballs and soccer balls. Each football takes 3 min on a cutting machine and 1 min on a stitching machine. A soccer ball takes 3 min on a cutting machine and 4 min on a stitching machine. What combinations of balls can be made in 1 hour or less?

Let $x = \#$ of soccer balls
 $y = \#$ of footballs

Cutting Minutes ///

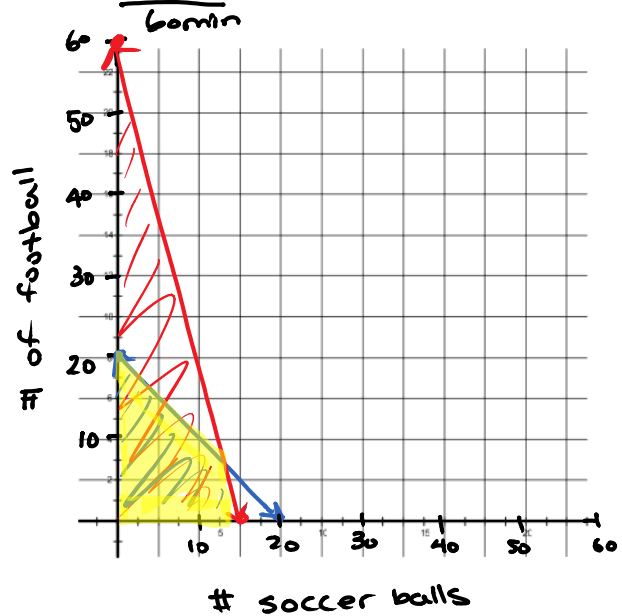
$$3x + 3y \leq 60$$

x -int ($y=0$) y -int ($x=0$)
 $3x + 3(0) = 60$ $3(0) + 3y = 60$
 $3x = 60$ $3y = 60$
 $x = 20$ $y = 20$

Stitching Minutes ///

$$4x + y \leq 60$$

x -int ($y=0$) y -int ($x=0$)
 $4x + 0 = 60$ $4(0) + y = 60$
 $4x = 60$ $x = 15$ $y = 60$



Hw: p. 317 # 4 ac, 6, 7

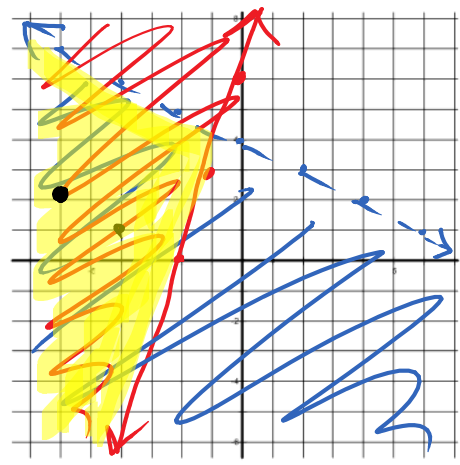
Example 2: Graph the solution set for the following system of inequalities. Choose two possible solutions from the set.

$$\begin{aligned} x + 2y &< 8 \\ 3x - y &\leq -6 \end{aligned}$$

$x + 2y = 8$
 $2y = -x + 8$
 $y = -\frac{1}{2}x + 4$

$3x - y = -6$
 $-y = -3x - 6$
 $y = 3x + 6$

/// $(0, 0)$
 $3(0) - 0 \leq -6$
 $0 \leq -6$ X

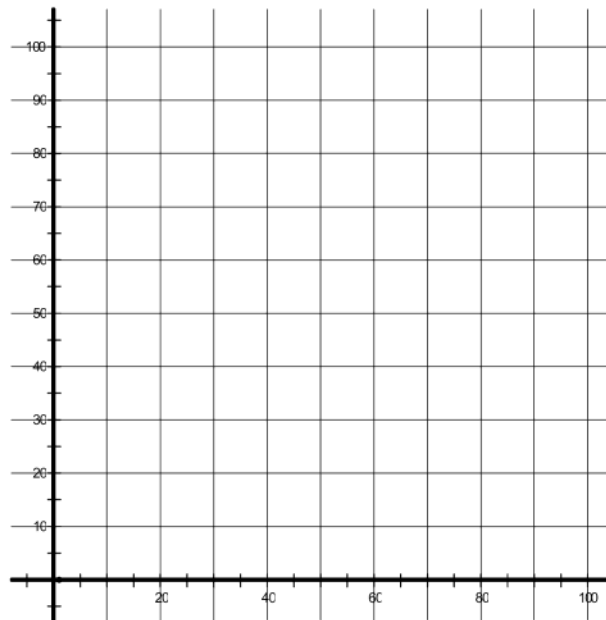


$(-6, 2)$ + $(-4, 1)$

Example 3: A sloop is a sailboat with two sails: a mainsail and a jib. When a sail is fully out or up, it is said to be “out 100%”. When the winds are high, sailors often reef, or pull in, the sails to be less than their full capability.

- Jim is sailing in winds of 22 knots, so he wants no more than 90% of the jib out.
- He wants to have at least twice as much jib as mainsail out.

What possible combinations of mainsail and jib can Jim have out?



Assignment: pg. 317 #4ac, 6-10, 12

