Finite Math - Spring 2017

Lecture Notes - 4/17/2017

Homework

- Section 5.1 - 9, 11, 13, 17, 29, 30, 52, 54

Section 5.1 - Linear Inequalities in Two Variables

Applications.

Example 1. *Define the variable and translate the sentence into an inequality:*

(a) *The number of overtime hours is less than* 20.

(b) *Full-time status requires at least* 12 *credit hours.*

Solution.

(a) *Let* $h =$*number of overtime hours, then* $h < 20$.

(b) *Let* $c =$*Full-time status, then* $c \geq 12$.

Example 2. *Define two variables and translate the sentence into an inequality: Enrollment in finite mathematics plus enrollment in calculus is less than* 300.

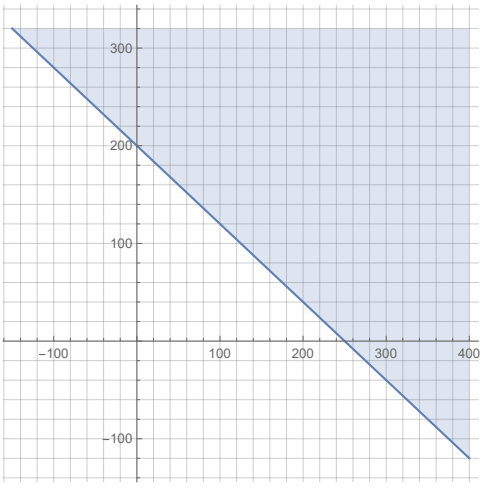
Solution. *Let* F *be the enrollment in finite math and let* C *be the enrollment in calculus. Then* $F + C < 300$.

Example 3. *A food vendor at a rock concert sells hot dogs for* \$4 *and hamburgers for* \$5. *How many of these sandwiches must be sold to produce sales of at least* $\$1,000$*? Express the answer as a linear inequality and sketch its graph.*

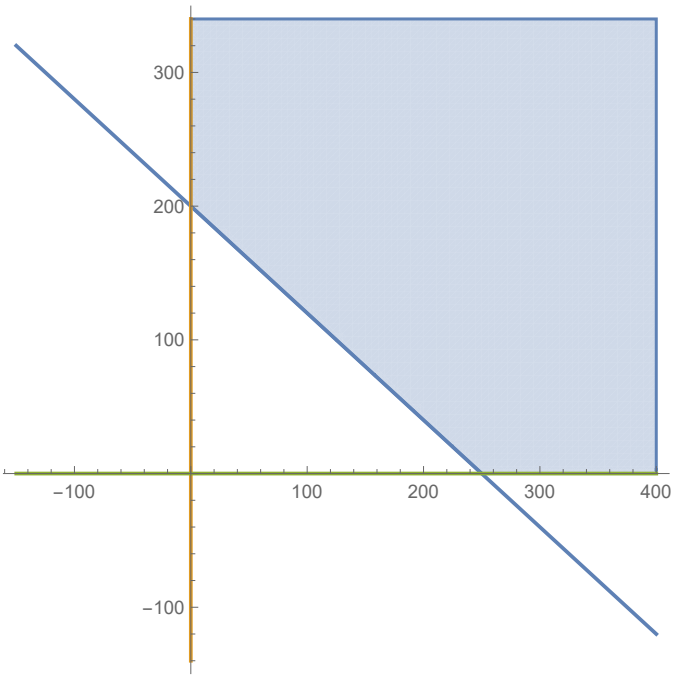
Solution. *Suppose the vendor sells* x *hot dogs and* y *hamburgers. Then the seller has made* $4x + 5y$ *dollars. The sellers wants to make at least* \$1000*, so we get*

$$4x + 5y \geq 1000.$$

If we graph this we get



But since a negative number of hot dogs or hamburgers cannot be sold, we also have the inequalities $x \geq 0$ and $y \geq 0$ to add to this which gives the graph



The solution is then

$$\begin{cases} 4x + 5y \geq 1000 \\ x \geq 0, \ \ y \geq 0 \end{cases}$$

Example 4. *Seed costs for a farmer are* \$40 *per acre for corn and* \$32 *per acre for soybeans. How many acres of each crop should the farmer plant if she wants to spend no more than* $\$5,000$ *on seed? Express the answer as a linear inequality and sketch its graph.*

Example 5. *A farmer wants to use two brands of fertilizer for his corn crop. Brand A contains* 26% *nitrogen,* 3% *phosphate, and* 3% *potash. Brand B contains* 16% *nitrogen,* 8% *phosphate, and* 8% *potash.*

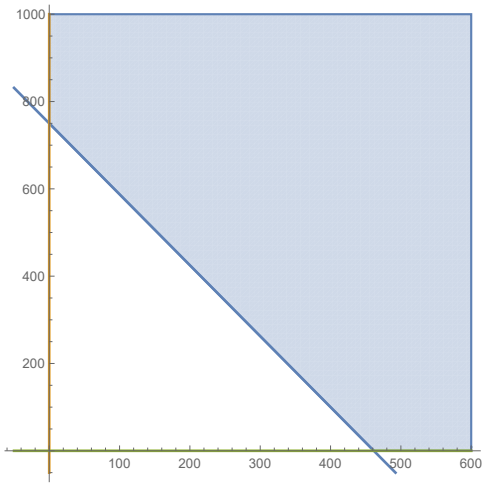
(a) *How many pounds of each brand of fertilizer should he add to each acre if he wants to add at least* 120 *pounds of nitrogen to each acre?*

(b) *How many pounds of each brand of fertilizer should he add to each acre if he wants to add at most* 28 *pounds of phosphate to each acre?*

Solution.

(a) *Let a be the number of pounds of brand A and let b be the number of pounds of brand B. Then*

$$0.26a + 0.16b \geq 120, a \geq 0, b \geq 0$$



(b)

$$0.03a + 0.08b \leq 28, a \geq 0, b \geq 0$$