Write an inequality to model each statement:

1. The elevator can hold up to 2300 lbs.

$E \le 2300$

2. The wheelbarrow can carry no more than 40 bricks.

$B \le 40$

3. The employee needs at least 40 hours of work this week.

$H \ge 40$

4. The farmer is going to plant some corn.

$C > 0$

5. The rancher raises cows and goats. He can raise no more than 250 animals.

$C + G \le 250$

6. It costs $40 to produce a chair and $75 to produce a table. The budget is $2000.

$40C + 75T \le 2000$

7. Basketballs cost $9 each and footballs cost $24 each.
You can spend no more than $144 on balls for the two teams.
You only have enough room on the equipment cart for 11 more balls.

a) Write a system of **four** inequalities to represent the constraints given.

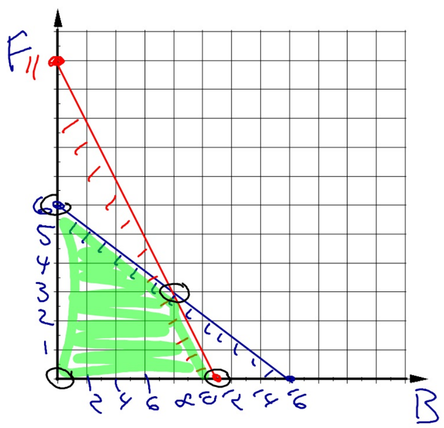
$9B + 24F \le 144$

$B + F \le 11$

$B \ge 0$

$F \ge 0$

b) Using a sheet of graph paper, graph this system of inequalities.



$b \ge 0$
$f \ge 0$
$9b + 24f \le 144$
$b + f \le 11$

$\left\{ \begin{array}{l} b\text{-int} = 16 \\ f\text{-int} = 6 \end{array} \right.$

$b\text{-int} = 11$
$f\text{-int} = 11$

c) State the coordinates of all four corners of the solution region (feasible region).

$(B,F) \rightarrow (0,6) \quad (0,0) \quad (11,0) \quad (8,3)$

8. If your players autograph the balls and you sell them you can get $15 for each basketball and $40 for each football. Write an equation that models the amount of money you can make by selling these balls.

$15B + 40F = T$

this is the Objective Function

How many of each should you buy and sell in order to MAXIMIZE the amount of money you can make?

Test the four corners of the feasible region in the Objective Function

B	F	$T = 15B + 40F$
0	0	0
0	6	240
11	0	165
8	3	240

A maximum of $240 can be made by purchasing and selling only 6 footballs or 8 basketballs & 3 footballs

Linear Programming:

A technique that identifies the minimum or maximum value of some quantity that is modeled with some Objective Function that meets a set of constraints.

Notes

Our book calls this the Vertex Principle

The Corner-Point Principle:
Any maximum or minimum value of a linear combination of variables will occur at one of the vertices of the feasible region (shaded region).

A farmer wants to plant some acres of soybeans and wheat this season.

w = # acres of wheat

s = # of acres of soy

- The farmer has up to 240 acres of land to use for these crops.
- The farmer has only enough seed for at most 180 acres of wheat.

Define variables and write four inequalities to model the constraints in this situation.

$s + w \le 240$

$w \le 180$

$w \ge 0$

$s \ge 0$