Part 1. A Montana farmer owns 45 acres of land. She is planning to plant each acre with wheat or corn. An acre of wheat yields $200 in profits; an acre of corn yields $300 in profits. Labor and fertilizer requirements per acre for wheat and corn are as follows:

- **Wheat**: 3 units of labor; 2 units of fertilizer
- **Corn**: 2 units of labor; 4 units of fertilizer.

If the farmer has 100 units of labor and 120 units of fertilizer, how many acres of wheat and corn should be planted to maximize profit?

Determine the maximum weekly profits **graphically** (see Giordano Chapter 7.2)

Using graph paper, do the following

a. Write down the objective function and the constraints

b. On a piece of graph paper, graph the feasible region. Label the coordinates of all extreme points. Neatness counts.

c. Create a table listing coordinates of the extreme points and values of the objective function at that point. Determine the maximum profit.

d. Use Mathematica’s `Maximize[]` function to check your work.

Carefully write up your results; label your graph.

2. Solve the same problem algebraically using the numeric techniques given in Chapter 7.3. Since there are two decision variables, all possible intersection points can be systematically determined by setting all possible distinguishable pairs of variables to zero and solving for the remaining variables. If a solution of the resulting system exists then it must be an intersection point. However a *negative* value for any of the variables indicates that the point would *not* be a feasible solution. Arrange your results in a table along with the value of the objective function for feasible solutions only and determine the maximum.

On the second sheet of graph paper do the following

a. Write down the objective function and all constraints (again)

b. Modify the above by adding slack variables.

c. Create a table of points; indicate which solutions are in the feasible region and give the corresponding value of the objective function. Indicate the solution.
Note this is not the Simplex method

3. Using the Simplex Method. Using the Mathematica Notebook SimplexExampleSp15.nb as a guide, solve the wheat & corn example above using the Simplex Method.

Not all of your results will be obtained via direct Mathematica calculations. You will have to insert some hand calculations on your equations to format them properly. I am primarily interested in seeing the three tableaux obtained via the Simplex Method, the 3rd containing the solution.