You are to solve the Basic Problem in two ways, and also solve the Enhanced Problem.

**Basic Problem:** Cardinal Fudge currently makes two kinds of fudge. A pound of chocolate fudge has 6 ounces of milk, 3 ounces of butter, 4 ounces of sugar, and 3 ounces of chocolate, and sells for $7.30. A pound of peanut butter fudge has 5 ounces of milk, 4 ounces of butter, 2 ounces of sugar, and 5 ounces of peanut butter, and sells for $6.80. Each ounce of milk costs $0.10, each ounce of butter costs $0.20, each ounce of sugar costs $0.15, each ounce of chocolate costs $0.50, and each ounce of peanut butter costs $0.40. The Shop has available this week 11,460 ounces of milk, 7800 ounces of butter, 6400 ounces of sugar, 4320 ounces of chocolate, and 8700 ounces of peanut butter. How many pounds of each type of fudge should be made from the available supplies to maximize profit?

1. Formulate the Basic Problem by completing items (a) – (d) below.
   (a) Name the variables that stand for the amount of each type fudge to be made this week.
   (b) Determine the profit on a pound of each type fudge and an equation for the total profit this week.
   (Note: The profit on a pound of fudge is defined to be its selling price minus the total cost of the ingredients included in the pound.)
   (c) Give a product/resource chart organizing the data about the products and the resources, and
   (d) Give a mathematical formulation of the constraints in terms of your variables.

2. Carefully graph the feasible region on the attached graph paper.
   (e) Label all the corner points and determine their coordinates. Show your work.
   (f) Use the Corner Point Principle to find the production policy (number of pounds of each type of fudge) for this week that gives the maximum total profit and what that maximum profit is. Describe your results in sentence form.

3. Use the Math 105 computational software (see attached) to solve the Basic Problem a second way.
   (g) Give the names of the slack variables that are introduced and their meaning.
   (h) Attach printouts of the initial and final simplex matrices from the computer program with your group members’ names typed in.
   (j) What are the basic and non-basic variables in the final matrix? What are the values of all the variables in the final matrix?
   (k) Answer the following questions in complete sentences:
      (i) What is the maximum profit Cardinal Fudge Shop can realize this week?
      (ii) How many pounds of each type of fudge should the company make to attain this maximum profit?
      (This should agree with the answer you obtained graphically in 2.)
      (iii) If Cardinal Fudge Shop pursues this production policy, how much of each resource will be unused?
   (m) EXTRA CREDIT: Of which resource should Cardinal Fudge Shop obtain more in order to increase profit fastest? At what rate would profit increase per extra unit of the resource?

**Enhanced Problem** Cardinal Fudge Shop is considering adding a "Big East" fudge to its product line. A pound of this fudge would contain 4 ounces of milk, 2 ounces of butter, 2 ounces of sugar, and 3 ounces of chocolate, and 5 ounces of peanut butter, and sell for $9.40. If they offer this fudge, how many pounds of each of the three types of fudge should be made from the available supplies in order to maximize profit?

4. Help Cardinal Fudge Shop decide whether to offer the “Big East” fudge. Solve the Enhanced Problem. Perform the steps Problems 1. and 3. above with this type of fudge as one of their products. (Do not attempt a graphical solution.) Would Cardinal Fudge Shop make a larger profit if they offered the “Big East” fudge too? Justify your answer.

Be sure to submit the Cover Sheet (on back) with your Project and adhere to the rules in the box at the bottom of that Cover Sheet!