Project: Linear Programming (Questions)

Due: March 29th, 2001.

Solve the following questions:

1. A trucking firm ships the containers of two companies, A and B. Each container of Company A weighs 40 pounds and is 2 cubic feet in volume. Each container of company B weighs 50 pounds and is 3 cubic feet in volume. The trucking firm charges Company A \$2.20 for each container shipped, and charges Company B \$3.00 for each container shipped. If one of the firm's trucks cannot carry more than $37,000$ pounds and cannot hold more that 2000 cubic feet, how many containers from companies A and B should a truck carry to maximize the shipping charges.

2. A candy manufacturer has 130 pounds of chocolate covered cherries and 170 pounds of choco-late covered mints in stock. She decides to sell them in the form of two different mixtures. One mixture (A) will contain half cherries and half mints and will sell for \$2.00 per pound. The other mixture (B) will contain one-third cherries and two-thirds mints and will sell for \$1.25 per pound.

   (a) Let x_1, x_2 be the number of pounds of each mixture to be prepared. write an expression for z, the total sales of the candy manufacturer.

   (b) Write an inequality involving the amount of cherries used.

   (c) Write an inequality involving the amount of mints used.

   (d) How many pounds per mixture should the candy manufacturer prepare in order to maximize his sales volume ?

3. For the following linear programming problem in standard form:

$$\text{Maximize} \quad z = 2x_1 + 3x_2 - x_3 + 4x_4 + x_5$$

   subject to

$$\begin{array}{lcl} 2x_1 + x_3 + 4x_4 + 2x_5 & = & 20 \\ x_1 + x_2 - x_3 + x_4 + 3x_5 & = & 10 \\ \text{and} & & \\ x_1, x_2, x_3, x_4, x_5 & \geq & 0, \end{array}$$

   (a) Show that the feasible set is bounded,

   (b) Use matlab to find all basic solutions of the linear system $Ax = b$,

   (c) Find all basic feasible solutions of the problem,

   (d) Find an optimal solution and the maximum value of the objective function.

[1] **Office hours:** Monday 1:30-3pm, 5-6pm, Wednesday 2:30-3:30pm, Thursday 1:30-3:00pm, Friday: 11:30-12:30 or by appointment.