## Week 6 Homework

## Chapter 2

1. A Cereal Company makes a cereal from several ingredients. Two of the ingredients, oats and rice, provide vitamins A and B. The company wants to know how many ounces of oats and rice it should include in each box of cereal to meet the minimum requirements of 45 milligrams of vitamin A and 13 milligrams of vitamin B while minimizing cost. An ounce of oats contributes 10 milligrams of vitamin A and 2 milligram of vitamin B, whereas an ounce of rice contributes 6 milligrams of A and 3 milligrams of B. An ounce of oats costs $\$ 0.06$, and an ounce of rice costs $\$ 0.03$.
a. Formulate a linear programming model for this problem.
b. Solve the model by using graphical analysis.
2. A Furniture Company produces chairs and tables from two resources- labor and wood. The company has 125 hours of labor and 45 board-ft. of wood available each day. Demand for chairs is limited to 5 per day. Each chair requires 7 hours of labor and 3.5 board-ft. of wood, whereas a table requires 14 hours of labor and 7 board-ft. of wood. The profit derived from each chair is $\$ 325$ and from each table, $\$ 120$. The company wants to determine the number of chairs and tables to produce each day in order to maximize profit. Formulate a linear programming model for this problem.
a. Formulate a linear programming model for this problem.
b. Solve the model by using graphical analysis. (Do not round the answers)
c. How much labor and wood will be unused if the optimal numbers of chairs and tables are produced?
3. Kroeger supermarket sells its own brand of canned peas as well as several national brands. The store makes a profit of $\$ 0.28$ per can for its own peas and a profit of $\$ 0.19$ for any of the national brands. The store has 6 square feet of shelf space available for canned peas, and each can of peas takes up 9 square inches of that space. Point-of-sale records show that each week the store never sales more than half as many cans of its own brand as it does of the national brands. The store wants to know how many cans of its own brand of peas of peas and how many cans of the national brands to stock each week on the allocated shelf space in order to maximize profit.
a. Formulate a linear programming model for this problem.
b. Solve the model by using graphical analysis.
4. Solve the following linear programming model graphically:

Minimize $\mathrm{Z}=8 \mathrm{X}_{1}+6 \mathrm{X}_{2}$
Subject to
$4 X_{1}+2 X_{2} \geq 20$
$-6 \mathrm{X}_{1}+4 \mathrm{X}_{2} \leq 12$
$X_{1}+X_{2} \geq 6$
$\mathrm{X}_{1}, \mathrm{X}_{2} \geq 0$

