Name: _____ Class: _____ Date: _____ ID: A

Lesson #5 B: Using Linear Programming to help Solve Real World Linear Applications (Reference: Lesson #54 in book)

Problem

1. **Use what you have learned about linear programing to minimize or maximize profits and costs in the following application problems given the constrants in each of the situations.**

   1. A manufacturer makes wooden desk and tables. Each desk requires 2.5 hours to assemble, 3 hours for buffing, and 1 hour to crate. Each table requires 1 hour to assemble, 3 hours to buff, and 2 hours to crate. The firm can do only up to 20 hours of assembling, 30 hours of buffing, and 16 hours of crating per week. The profit is $300 for a desk and $500 for a table. How can the manufacturer maximize his revenue while still staying with in the constraints.

2. A farmer can plant up to 8 acres of land with wheat and barley. He can earn $5,000 for every acre he plants with wheat and $3,000 for every acre he plants with barley. His use of a necessary pesticide is limited by federal regulations to 10 gallons for his entire 8 acres. Wheat requires 2 gallons of pesticide for every acre planted and barley requires just 1 gallon per acre. How many acres of each must be plant in order to maximize his profits for the season.

3. Kustom Kars does van conversions. The Custom Conversion requires 15 hours of shop time, 8 hours of painting time, and 1 hour of inspection time. The Deluxe Conversion requires 12 hours of shop time, 12 hours of painting time, and 1.5 hours of inspection time. There are 90 hours of shop time, 72 hours of painting time, and 10 hours of inspection time available during the coming two weeks. How many conversions of each type should Kustom Kars perform assuming that each Custom Conversion results in $175 profit and each deluxe conversion results in $225 profit and assumming they want to maximize their profits?

4. Impact Printing makes two kinds of computer paper using premium or ordinary quality stock. They have a contract to supply at least 5000 cases of paper. There is only enough stock to make 4000 cases of premium paper, but ample stock of ordinary paper. Both kinds are made with the same machine and 1200 hours or machine time are available. Premium paper takes 18 minutes per case to make and ordinary paper takes 12 minutes per case. The profit on each is $4 per case and $3 per case respectively. How many of each type of paper must be made in order to maximize the companies profit.

5. On a chicken farm, the poultry is given a healthy diet to gain weight. The chickens have to consume a minimum of 15 units of Substance A and another 15 units of Substance B. In the market there are only two classes of compounds: Type X, with a composition of one unit of A and to five units of B, and another Type Y, with a compisition of five units of A to one of B. The price of Type X is $10 and Type Y is $30. What are the quantities of each type of compound that have to be purchased to cover the needs of the diet with a minimual cost?