Game Theory Questions

Math 20

Due October 20, 2004

1. Find values of x_1 and x_2 that maximize
$$z = 3x_1 + 2x_2$$
subject to
$$2x_1 + 3x_2 \leq 6$$
$$3x_1 - x_2 \geq 0$$
$$x_1 \leq 2$$
$$x_2 \leq 1$$
$$x_1 \geq 0$$
$$x_2 \geq 0$$

2. Find values of x_1 and x_2 that minimize
$$z = 3x_1 - 5x_2$$
subject to
$$2x_1 - x_2 \leq -2$$
$$4x_1 - x_2 \geq 0$$
$$x_2 \leq 3$$
$$x_1 \geq 0$$
$$x_2 \geq 0$$

3. A trucking firm ships the containers of two companies, A and B. Each container from company A weighs 40 pounds and is 2 cubic feet in volume. Each container from company B weight 50 points 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 can cannot hold more than 2000 cubic feet, how many containers from companies A and B should a truck carry to maximize the shipping charges?

4. Repeat Exercise 3 if the trucking firm raises its price for shipping a container from company A to \$2.50

5. A manufacturer produces sacks of chicken feed from two ingredients, A and B. Each sack is to contain at least 10 ounces of nutrient N_1, at least 8 ounces of nutrient N_2, and at least 12 ounces of nutrient N_3. Each pound of ingredient A contains 2 ounces of nutrient N_1, 2 ounces of nutrient N_2, and 6 ounces of nutrient N_3. Each pound of ingredient A contains 5 ounces of nutrient N_1, 3 ounces of nutrient N_2, and 4 ounces of nutrient N_3. If ingredient A costs 8 cents per pound and ingredient B consts 9 cents per

pound, how much of each ingredient should the manufacturer use in each sack of feed to minimize its costs?

6. If the objective function of a linear programming problem has the same value at two adjacent extreme points, show that it has the same value at all points on the straight line segment connecting the two points.