Optimization Practice (4.4)

1. If 40 passengers hire a special car on a train, they will be charged $8 each. This fare will be reduced by $.10 each passenger, for each person in addition to these 40. What number of passengers will produce the maximum profit for the railroad?

2. A fruit grower estimates that if he harvests his crop of oranges now, he will get 100 pounds per tree, which he can sell for $.25 per pound. For each week he waits, he estimates that the crop will increase by 10 lb. per tree, but the price will decrease by $.01 per week. When should he pick the oranges to obtain the maximum profit? What would his profit be at this time?

3. A rectangular box with a square base and a cover is to be built to contain 640 cubic feet. If the cost per square foot for the bottom is $15 and for the top and the sides is $10, what is the minimum cost of the constructed box?

4. A tinsmith wishes to make an open box from a square piece of tin which measures 8" by 8". To accomplish this task, he proposes to cut equal square pieces from each corner of the tin and fold up the tin to form sides. Determine the sides of the squares to be cut from the corners so that the box will have the greatest possible volume. What is this volume?

5. Find two numbers whose sum is 48 and whose product is to be a maximum.

6. Suppose that a rancher has 1000 feet of fencing available to make a rectangular corral. A barn will form one side of the corral so no fencing will be needed there. What dimensions will give the maximum area?

7. Allen Rent-A-TV derives an average profit of $15 per customer if it services 1000 customers or less. If it services over 1000 customers, the profit decrease per customer by $.01 for each customer over 1000. How many customers will give the maximum profit?