Use an appropriate second degree function to solve each of the following problems. Show your work and your solutions neatly organized.

1. A rectangle has two sides on the coordinate axes and one vertex in the first quadrant on the line **$2x + 3y = 15$**. What are the dimensions of the rectangle if its area is a maximum? What is the maximum area?

2. Alice wants to fence in a rectangular plot of land **and** to divide it into three equal areas using two lengths of fencing parallel to two opposite sides. If she has a total of 1000 feet of fencing to work with, then find the dimensions that will maximize the total area enclosed. What is the maximum area?

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Use an appropriate second degree function to solve each of the following problems. Show your work and your solutions neatly organized.

3. The owner of a large apartment building with forty units has found that if the rent for each unit is $600 per month, then all of the units will be rented. But one unit will become vacant for each increase of $20 per month. What rate should be charged per month per unit in order to maximize the total monthly income? What is the maximum monthly income?

4.   A television set manufacturer can sell 200 sets per month for $800 per set. Marketing research indicates that the company can sell 20 more sets per month for each $25 decrease in price. What price per set will give the greatest monthly income? What is the maximum monthly income?