

## Extra Chapter 7 Problems

1. An apple farm yields an average of 30 bushels of apples per tree when 20 trees are planted on an acre of ground. Each time one more tree is planted per acre, the yield decreases one bushel per tree due to the extra congestion. How many trees should be planted in order to get the highest total yield?
2. A Norman window is a rectangle with a semicircle on top. Suppose that the perimeter of a particular Norman window is to be 24 feet. What should its dimensions be in order to maximize the area of the window and, therefore, allow in as much light as possible?
3. If the graph of the quadratic function  $f(x) = x^2 + dx + 3d$  has its vertex on the  $x$ -axis, what are the possible values of  $d$ ? What if  $f(x) = x^2 + 3dx - d^2 + 1$ ?