Max/Min Problems

1. Determine the maximum product of two positive numbers whose sum is 8.
2. Determine the maximum area of a rectangle that can be enclosed with 200 meters of fence.
3. Determine the minimum area of a poster that will contain 50 square inches of printed material and have 4 inch margins on the top and bottom and 2 inch margins on the left and right.
4. Determine the dimensions of a box of maximum volume that can be made from a piece of material 8"X10". The box is to be made by cutting square pieces from the corners and folding up the sides. The box will not have a top.
5. Determine the maximum area of a rectangle with one side on the x-axis and the opposite corners touching the parabola $y = -x^2 + 9$.
6. A rectangle is to be inscribed in a right triangle having sides 6 inches, 8 inches, and 10 inches. Determine the dimensions of the rectangle with greatest area.
7. Given the length of string L=50 inches, construct a circle and a square such that the sum of the areas is a maximum.
8. This is the infamous Question 6 on the 1982 A.P. Exam which was the focus of the movie, Stand and Deliver.

   A tank with a rectangular base and rectangular sides is to be open at the top. It is constructed so that its width is 4 meters and its volume is 36 cubic meters. If building the tank costs $10 per square meter for the base and $5 per square meter for the sides, what is the cost of the least expensive tank?