1. A rectangle has its base on the x-axis and its upper two corners on the parabola $y = 12 - x^2$. What is the largest area the rectangle can have?

2. An open-topped box is to be formed by starting with a flat, rectangular piece of cardboard that is 18" × 24", cutting squares from each corner, and folding up to form the box. What is the largest volume that the box can hold?

3. A cable is to be run from a power plant on one side of a river to a factory on the other side. It costs \$4 per meter to run the cable over land, while it costs \$5 per meter to run the cable under water. Suppose the river is 300 meters wide and the factory is 1000 meters downstream from the power plant. What is the most economical route to lay the cable? How much will it cost?