More Optimization Problems
(Section 4.5)

Ex 1: A square sheet of tin 2 meters on a side is to be used to make an open-top box by cutting a small square of tin from each corner and bending up the sides. How large a square should be cut from each corner in order that the box have as large a volume as possible?

(a) What is to be optimized?
(b) Make sketches. What varies? How are they related? Label your sketches clearly by assigning variables to quantities which vary.
(c) Obtain a formula for the function to the optimized in terms of the variables that you identified in part b. If necessary, choose one variable and write the others in terms of this one. What is the domain of this variable?
(d) What are the critical points? Evaluate the function at these points and at the endpoints to find the global maxima or minima.

Ex 2: A silo is to be made in the form of a cylinder surmounted by a hemisphere. The cost of construction per square foot of surface area is twice as great for the hemisphere as for the cylinder. Determine the dimensions to be used if the volume is fixed and the cost of construction is to be a minimum. Neglect the thickness of the silo and waste in construction. The floor of the silo is not included in this construction.