- 1. CHAPTER 4 SECTION 3: OPTIMIZATION AND MODELING MAIN STEPS
- Step 1. Read the problem and express all information from the problem mathematically. Use variables to represent any quantity that changes. Numbers may be used for quantities that remain constant.
- Step 2. Find a function for the quantity to be optimized in terms of one variable.
- Step 3. Find the absolute extreme required using the techniques discussed in the notes on finding extrema.
- Step 4. Reread the problem and answer the question.

2. Examples

Example 2.1 (4.3 WP Homework Question 4, Text 10). Find the dimensions of the solid with the minimum surface area, given that the volume is 8 cm³. The shape is a cylinder open at one end with radius r cm and height h cm.

Example 2.2 (4.3 Text 15a). A rectangle has one side on the x-axis, one side on the y-axis, one vertex at the origin, and one on the curve $y = e^{-2x}$ for $x \ge 0$. Find the maximum area.

Example 2.3 (4.3 Text 26a). A piece of wire of length L cm is cut into two pieces. One piece, of length x cm, is made into a circle; the rest is made into a square. Find the value of x that makes the sum of the areas of the circle and the square a minimum. Find the value of x givign a maximum.