

(Section 4.7) Guidelines for solving optimization problems:

1. **Read** and identify the unknown and given information.
2. **Draw a picture.**
3. **Introduce notation** and variables to essential components of your picture. Assign some variable to the quantity that is to be maximized (or minimized). For the remainder of the guidelines, let's say the quantity is named  $Q$ .
4. Find an **Equation** to express  $Q$  in terms of the other variables introduced in step 3.
5. **Use the given information** to write  $Q$  as a function of a single variable. For example, if you can express  $Q$  in terms of  $x$  alone, then  $Q$  is now a function of a single variable:  $Q = f(x)$ . After this is done, write the **domain** of  $Q$ .
6. Use known techniques to find the absolute maximum (or minimum) of  $Q = f(x)$  to solve the original problem. Some techniques you should consider using:
  - (a) **The Closed Interval Method** (See 4.1, p.275). **N.B. You must find a closed interval as domain for  $Q$ !**
  - (b) **First Derivative Test for Absolute Extreme Values** (See 4.7, p.324). **N.B.  $Q$  must satisfy the hypotheses of the test!**