Math 444 (Cowen) **Reading Assignment 4** **Due 2:00p, 3 November 2010**

Read Chapter 5, Section 3 of Bartle & Sherbert's book; then, send email to `ccowen@math.iupui.edu` with your answers to the following questions:

1. "Was this section clear?" "Do you have any questions?"

2. The Maximum-Minimum Theorem (Thm 5.3.4) has hypotheses that require the function f to be continuous on a closed and bounded interval.

(a) Find a continuous function on a closed, but unbounded interval that does not have an absolute maximum value.

(b) Find a continuous function on a bounded, but not closed interval that does not have an absolute maximum value.

(c) Find a function that is defined, but not continuous, on a closed and bounded interval that does not have an absolute maximum value.

3. The Location of Roots Theorem (Thm 5.3.5) has hypotheses that require the function f to be continuous on an interval $[a, b]$ with $f(a) < 0 < f(b)$ or $f(b) < 0 < f(a)$. Find a function that is defined, but not continuous, on the interval $[1, 4]$ and satisfies $f(1) < 0 < f(4)$ but for which there is no number c with $1 < c < 4$ so that $f(c) = 0$.

4. The proof of the Location of Roots Theorem (Thm 5.3.5) uses the bisection method. Let $f(x) = x^2 - x - 1$. Notice that $f(1) = -1 < 0$ and $f(2) = 2 > 0$. Use the bisection method to find five intervals, starting with $[1, 2]$, of lengths 1, 1/2, 1/4, 1/8, and 1/16 such that there is a point c in each of them with $f(c) = 0$.