

**Math 444 (Cowen)      Reading Assignment 5      Due 2:00p, 29 November 2010**

Read Chapter 6, Section 1 of Bartle & Sherbert's book; then, send email to [ccowen@math.iupui.edu](mailto:ccowen@math.iupui.edu) with your answers to the following questions:

1. "Was this section clear?" "Do you have any questions?"
2. Do problem 7, page 167 of the text. Contrast the differentiability of  $f(x) = |x^3|$  with that of  $g(x) = |x^3 + x|$  at  $c = 0$ .
3. Do problem 9, page 167 of the text.
4. Let  $f$  be the polynomial  $f(x) = 2x^3 + 5x^2 - x + 1$ . We know  $f$  is differentiable at each point  $c$  in  $\mathbb{R}$ , so for each  $c$  in  $\mathbb{R}$ , there is a Carathéodory function  $\varphi$  which is continuous at  $c$  and satisfies  $\varphi(c) = f'(c)$ . That is, for each  $c$  in  $\mathbb{R}$ , there is  $\varphi$  which is a function of  $x$ , but depends on  $c$ . We often call functions of one variable that depend on another a function of two variables: Find the polynomial  $g(x, c)$  so that for each  $c$  in  $\mathbb{R}$ ,  $g(x, c) = \varphi(x)$ , where  $\varphi$  is the Carathéodory function for  $f$  at the point  $c$ .