Math 115 Quiz 4: § 2.5-6 and Barehanded Differentiation **Mon 11 October 2010**

Name: _____

You have 25 minutes to complete this quiz. Calculators are OK.

1. **Definitions/Concepts.** (1 pt) Let g be the function defined by

$$g(x) = \begin{cases} 1 & \text{if } x \leq 0 \\ \cos x & \text{if } 0 < x < \frac{\pi}{2} \\ 0 & \text{if } x > \frac{\pi}{2} \end{cases} .$$

   Which of the following statements are true? Check all that apply.

   (a) g is continuous at $x = 0$

   (b) g is continuous at $x = \frac{\pi}{2}$

   (c) g is differentiable at $x = 0$

   (d) g is differentiable at $x = \frac{\pi}{2}$

2. **Questions/Problems.** A Purple-Headed Uniquely Nocturnal Chartreuse And Luridly Colored wombat is sighted moving across the diag. Its position, measured in feet from the West Engineering arch, is given as a function of time (in minutes past midnight) in the following table.

t	0	5	10	15	20	25	30
position	0	7	15	27	30	31	218

   (a) (4 pts) Estimate the wombat's velocity at $t = 0$, $t = 5$, $t = 10$ and $t = 15$.

   (b) (2 pts) Estimate the wombat's acceleration at $t = 5$ and $t = 10$.

   (c) (1 pt) What do you think happened between $t = 25$ and $t = 30$?

3. **Computations/Algebra.** (2 pts) Use the limit definition of the derivative to compute the following. You *must* show all steps.

$$\frac{d}{dx}\left(\frac{x^2+3}{x^9}\right)$$