Assignment #9

Due on Wednesday October 8, 2008

Read Section 7.4 on *The Derivative,* pp. 187–197, in Bressoud.

Do the following problems

1. Exercises 7(a) and 7(b) on pages 197 and 198 in the text.

2. Exercise 7(c) on page 198 in the text.

3. Exercise 8 on page 198 in the text.

4. Exercise 14 on pages 198 and 199 in the text.

5. A set $U \subseteq \mathbb{R}^n$ is said to be **path connected** iff for any pair of vectors x and y in U, there exists a differentiable path $\sigma \colon [0, 1] \to \mathbb{R}^n$ such that $\sigma(0) = x$, $\sigma(1) = y$ and $\sigma(t) \in U$ for all $t \in [0, 1]$; that is, any two elements in U can be connected by a differentiable path whose image is entirely contained in U.

   (a) Prove that the ball $B_R(O) = \{x \in \mathbb{R}^n \mid \|x\| < R\}$ is path connected.

   (b) Give and example in $\mathbb{R}^2$ of a set which is not path connected.