Homework 4 – due 10/03/03

Math 340

Problems for practice (highly recommended, but not to be handed in):

1.7.6, 1.7.7, 1.7.10, 1.7.11.

Problems to be handed in:

1. Problem 1.3.22.

2. Problem 1.7.12.

3. Problems 1.7.19 and 1.7.22.

4. Let $T : \mathbb{R}^n \to \mathbb{R}^m$ be a linear transformation. Prove that T is continuous. Hint: We explained briefly in class how to prove that

$$\lim_{\mathbf{h} \to \mathbf{0}_n} T(\mathbf{h}) = \mathbf{0}_m,$$

where $\mathbf{O}_n$ denotes the zero vector in $\mathbb{R}^n$. This of course would prove that T is continuous at the origin in $\mathbb{R}^n$. Give the details of that argument, and then use that result to prove that T is continuous everywhere else.

5. Let $T : \mathbb{R}^n \to \mathbb{R}^m$ be a linear transformation.
(a) Prove that T is differentiable.
(b) Find the Jacobian of T at any $\mathbf{a} \in \mathbb{R}^n$.