Linear Algebra (MATH 3333) Fall 2007 Sections 1/4
Homework 11

Due: Fri. Nov. 2, start of class

Instructions: You may **not** use a calculator (or computer). Make sure to write your name, course and section numbers in the top right corner of your solution set, as well as the assignment number on top.

Reading

Section 6.1, Section 6.3

Conceptual Questions

1. How is our new definition of linear transformations different from the old one?

2. What is the relationship between linear transformations, matrices and bases?

Written Assignment

32 points

Section 6.1 (pp. 373–374): 3 (6 pts), 11 (6 pts), 13, (4 pts), 15 (4 pts), 24 (2 pts), 25 (2 pts), 28 (2 pts), 29 (2 pts)

Problem A. (4 pts) Let $S = \{1, t, t^2\}$, which is a basis for $P_2 = \{a_0 + a_1 t + a_2 t^2\}$. Let L be the linear operator on P_2 given by differentiation, i.e.,

$$L(a_0 + a_1 t + a_2 t^2) := \frac{d}{dt}(a_0 + a_1 t + a_2 t^2) = a_1 + 2a_2 t.$$

Write down the 3×3 matrix A for L with respect to the basis S, i.e. A is the matrix such that

$$A[p(t)]_S = [\frac{d}{dt} p(t)]_S$$

for all $p(t)$ in P_2. Then write down the matrix B for L with respect to the basis $T = \{t^2, t, 1\}$ for P_2.