Math 4326 — **LINEAR ALGEBRA** — Spring 2008

Dr. Duval — **Homework**

Thursday, February 14

Follow the separate general guidelines for Parts A,B,C. Be sure to include and label *all four* standard parts (a), (b), (c), (d) of Part A in what you hand in.

The Matrix of a Linear Map (part II)

pp. 51–53

A: Reading questions. Due by 2pm, Wed., 20 Feb.

1. In the long string of equalities in the middle of p. 51, what are u_k, v_r, and w_j?
2. Why define $\mathcal{M}(v)$ as it is defined in equation 3.13, as opposed to the more simple definition given for $\mathcal{M}(x)$ a little lower in the same page?
3. Why do we need a proof for Proposition 3.14? Why can't we just use equation 3.11?

B: Warmup exercises. For you to present in class. Due by end of class Thu., 21 Feb.

Ch. 3: Exercises 17, 18, 19.

Invertibility (Part I)

pp. 53–55

A: Reading questions. Due by 2pm, Mon., 25 Feb.

1. How many inverses can a linear transformation have?
2. When, if ever, in the proof of Proposition 3.17 do we use the linearity of T or of any other map?
3. In the first half of the proof of Theorem 3.18, it is claimed, "Because T is invertible, we have $\operatorname{null} T = \{0\}$ and $\operatorname{range} T = W$." Why is this implication true?
4. In the second half of the proof of Theorem 3.18, an invertible linear map T is defined (different from the T in the first half of the proof). In this set-up, what is $T(v_i)$?

   Recall that $\dim \mathcal{P}_m(\mathbf{F}) = m + 1$. Thus, Theorem 3.18 guarantees that $\mathcal{P}_m(\mathbf{F})$ is isomorphic to $\mathbf{F}^{m+1}$. Now pick nice bases of $\mathcal{P}_m(\mathbf{F})$ and $\mathbf{F}^{m+1}$, and describe the invertible linear map T that shows they are isomorphic.

B: Warmup exercises. For you to present in class. Due by end of class Tue., 26 Feb.

Ch. 3: Exercise 22.