Math 4326 **LINEAR ALGEBRA** Spring 2008
Dr. Duval **Homework**
Thursday, February 21

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.

Invertibility (Part II)

pp. 56–58

A: Reading questions. Due by 2pm, Wed., 27 Feb.

1. Why is it necessary to explicitly mention the bases $(v_1, \ldots, v_n)$ and $(w_1, \ldots, w_m)$ for V and W, respectively, in the statement of Proposition 3.19? [Hint: Recall the definition of $\mathcal{M}$.]
2. An easy corollary to Proposition 3.19 is that two vector spaces are isomorphic. Which ones, and why?
3. Why is Theorem 3.21 remarkable?
4. Theorem 3.21 claims that 3 statements, (a), (b), and (c), are equivalent. Yet, while the proof directly shows that (a) implies (b), it does not show directly that (b) implies (a). Why is this acceptable? How do we know (b) implies (a)?

B: Warmup exercises. For you to present in class. Due by end of class Thu., 28 Feb.

Ch. 3: Exercise 20.

Polynomials

pp. 63–72

Note the summary on p. 63. Indeed, you are not responsible for any of the *proofs* in this chapter, but you should become familiar with the *statements* of all the results.

A: Reading questions. Due by 2pm, Mon., 3 Mar.

1. Pick a polynomial of degree 3. Demonstrate Proposition 4.1 on your polynomial. That is, find a root λ (be sure to demonstrate it's a root), and the corresponding polynomial $q(x)$. [Hint: Plan ahead! Pick a polynomial that will make your job easier.]
2. Pick an $m \geq 4$. Find a polynomial p with degree m such that p has less than m distinct roots.
3. Why does Corollary 4.8 have to include the phrase "(except for the order of the factors)"?
4. Why might your answer to question 2 above *seem* to contradict Corollary 4.8? Why doesn't it *actually* give a contradiction?
5. Describe as clearly as you can the differences between factorization in $\mathcal{P}(\mathbf{C})$ and factorization in $\mathcal{P}(\mathbf{R})$. [Hint: Focus on Corollary 4.8.]

B: Warmup exercises. For you to present in class. Due by end of class Tue., 4 Mar.

Ch. 4: Exercises 1, 5.

Verify the following properties on pp. 69–70: sum of z and $\bar{z}$; product of z and $\bar{z}$; and multiplicativity of complex conjugate.