Math 4326 | **LINEAR ALGEBRA** | Spring 2008

Dr. Duval

Homework

Thursday, January 24

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.

Bases

pp. 27–31

A: Reading questions. Due by 2pm, Wed., 30 Jan.

1. A note in the margin of p. 27 claims that the proof of Proposition 2.8 is "essentially a repetition of the ideas that led us to the definition of linear independence." Compare and contrast the proof of Proposition 2.8 to the the ideas leading to linear independence.
2. Verify that the process in the proof of Theorem 2.10 produces $((1,2),(4,7))$ when applied to the list $((1,2),(3,6),4,7),(5,9))$, as suggested on p. 29. Also verify that $((1,2),(4,7))$ is indeed a basis of $\mathbf{F}^2$.
3. Verify that the list $((2,3,1),(1,-1,2))$ [the first two vectors from the list in the middle of p. 24] in $\mathbf{F}^3$ can be extended to a basis in $\mathbf{F}^3$, as promised by Theorem 2.12. [Hint: Use the proof of Theorem 2.12.]

   Then, similarly, verify Proposition 2.13, using the span of $((2,3,1),(1,-1,2))$ for U, and using $\mathbf{F}^3$ for V.

B: Warmup exercises. For you to present in class. Due by end of class Thu., 31 Jan.

Ch. 2: Exercises 8, 9.

Dimension

pp. 31–34

A: Reading questions. Due by 2pm, Mon., 4 Feb.

1. What is the significance of Theorem 2.14? Why must it be the first result of this section? [Hint: What is the name of this section?]
2. Find the definition of "finite dimensional" vector space in the text. [Hint: Believe it or not, it is **not** in this section!] How does it compare to the definition of "dimension" in this section? Why are these two definitions compatible?
3. Which do you think will prove to be more useful, Proposition 2.16, or Proposition 2.17? Why?
4. Verify that Theorem 2.18 works when U_1 is the xy-plane, and U_2 is the yz-plane, in $\mathbf{R}^3$.
5. The proof of Proposition 2.19 uses the assumption that equation 2.20 holds in order to show that a certain list of vectors spans V. [See the second sentence of the proof.] Verify that this list does span V.

B: Warmup exercises. For you to present in class. Due by end of class Tue., 5 Feb.

Ch. 2: Exercises 11, 12, 13.