MATH 254: HOMEWORK

CHAPTERS 4 and 5

- The assignments for Chapters 4 and 5 are due on the day that you take Midterm 2.
- Answers to odd-numbered problems are in the back of the textbook.
- Show work where appropriate, **write your name on your homework**, and use the Student Solutions Guide wisely.

CHAPTER 4

Section 4.1 (p.169) #1-13 odd, 17-23 odd

Section 4.2 (p.176) #1-11 odd, 13-24 all, 31, 32

#24: See pp.173-174.
#31, 32: You don't have to justify your "True" answers.

Section 4.3 (p.184) #1-4 all, 7-12 all, 14-21 all, 23-26 all, 28, 29

Note: $\in$ means "is a member of"
#28: The union of two sets is the set of all elements that are in one or both sets. A graphical perspective may help.
#29: We want to show that the set of all 2×2 matrices that commute with A (in a multiplicative sense) form a subspace of $M_{2,2}$.

Section 4.4 (p.196) #1, 3a, 5-33 odd, 35abd, 37, 39, 43, 45, 47, 48, 49, 53, 54

Section 4.5 (p.207) #1-13 all, 15, 17-20 all, 21-33 odd, 35-40 all, 53, 54

Section 4.6 (p.222) #1-21 odd, 25, 27, 31, 33, 35, 36, 41, 49a-e

#1-7: When finding a basis for the column space, the textbook uses the fact that $\text{Col}(A) = \text{Row}(A^T)$. If you use the alternate method we discussed in class (which I recommended if you also needed to find a basis for $\text{Row}(A)$), your answers may look different from those given in the back of the book.

Sections 4.7, 4.8 (skip)

4.7 will be discussed when we do Chapter 6. I mentioned some of this material in my 4.5 notes.

4.8 provides a preview of some topics in differential equations (Math 255).

SEE BACK

CHAPTER 5

(Chapter 5 will receive less emphasis than Chapter 4 on the midterm.)

Section 5.1 (p.262) #1, 7-33 odd, 41-59 odd, 63-72 all, 74, 77, 79, 80

#33: You don't need a graphing utility.

#71, 72: Consider a conveniently oriented unit cube in *xyz*-space.

#72: Answer: $\theta \approx 35.3^\circ$

Section 5.2 (p.274) #41, 43

Optional: Look at Examples 4 and 5 on p.266 for some examples of inner products on vector spaces other than R^n.

On the midterm, I will remind you that if **v** and **w** $(\mathbf{w} \neq \mathbf{0})$ are two vectors in R^n, the orthogonal projection of **v** onto **w** (using the dot product as our inner product) is

$$\text{proj}_{\mathbf{w}}\mathbf{v} = \left(\frac{\mathbf{v} \bullet \mathbf{w}}{\mathbf{w} \bullet \mathbf{w}}\right)\mathbf{w}$$

This may help you with 5.3-type problems, as well.

Section 5.3 (p.286) #1-9 odd, 13, 17-31 odd, 37, 52

Sections 5.4, 5.5 (skip)

Optional: Take a look at pp.302-307 on cross products in Section 5.5, especially if you are going on to Math 252 (Calc III) or 255 (Differential Equations).