MATH 254: HOMEWORK

CHAPTERS 1, 2, and 3

- The assignments for Chapters 1, 2, and 3 are due on the day that you take Midterm 1.
- 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 1

Section 1.1 (p.11) #1-9 odd, 27, 29, 59, 71, 72

Section 1.2 (p.24) #1-31 odd (use matrices), 37-43 odd, 47, 49, 51, 57, 60

#25: The solutions guide should have put its final matrix in row-echelon form.
#60: Hint: Use substitution. Two solutions: (2,-1), (-2,-1).

Section 1.3 (p.35) #1, 3, 19 (On #19: Just write the system.)

CHAPTER 2

Section 2.1 (p.52) #1, 3, 9-19 odd, 25, 29, 31, 33, 37-43 odd, 44, 49, 51, 52, 53

#25: Hint: Let $A = \begin{bmatrix} p & r \\ q & s \end{bmatrix}$. We will discuss this issue further in Section 2.3.
#39: Proofs may vary.
#52: This is a Markov Chain problem seen in a course on probability.

Section 2.2 (p.64) #1-13 odd, 17, 18, 19, 21, 23, 27, 28, 29, 31, 32, 33, 35, 37, 39, 51, 53, 59

#27, 28: You don't need to give examples.
#32d: Assume that the matrices are the same size.
#33: These issues come up again in Chapter 4!!
#35, 37: Hint: See 2.1 #31.

Section 2.3 (p.77) #1-13 odd, 19, 23-29 odd, 34-43 all, 45-49 all

Section 2.4 (p.88) #1-20 all, 29-33 all, 35, 36, 41, 42, 43-57 odd, 58

#42c: Answer: (2,1,1,1)

Section 2.5 (p.105) #29b (See Example 10 on p.102.)

SEE BACK

CHAPTER 3

Section 3.1 (p.119) #1-11 odd, 17, 18, 19-31 odd, 37-43 odd, 44, 45,
51 (then, look at 52), 53

#19-31 odd, 51: You may use Sarrus's Rule to compute determinants of 3×3 matrices, if you wish. See Example 5 on p.117.

#45: A preview of Chapter 7 (eigenvalues)!!

Section 3.2 (p.127) #1-17 odd, 29, 30, 31, 33, 35, 39, 40, 42

#42: Remember that the *i*th row expansion of det(*A*) is

$$\det(A) = \sum_{j=1}^{n} a_{ij}C_{ij} = a_{i1}C_{i1} + a_{i2}C_{i2} + ... + a_{in}C_{in},$$

where C_{ij} is the cofactor of a_{ij}.

Section 3.3 (p.135) #1-13 odd, 19-31 odd, 35-39 all, 41-51 all, 53, 55, 57, 58, 59

#11, 13: Use shortcuts; you don't have to directly compute any determinants besides det(*A*) when you find the other determinants.

#36: Answer: 24.

#41: Also, explain why.

#43: You don't have to prove (ii) rigorously; at least understand why it is true. We did the proof in class.

#44:

(ii) We assume that $\det(A) = \det(A^T)$ for all matrices of order $n-1$, i.e., size $(n-1)\times(n-1)$. For more on mathematical induction, see p.A2 in Appendix A.

(iii) Let D_{ij} be the *ij*-cofactor of A^T.

#47, 48: Assume that matrix and vector sizes are compatible.

Section 3.4 (p.150) #31, 33, 39, 43

Look at #50: Hint: "Draw perpendiculars" to verify the system.

Look at pp.146-150 for some neat applications of determinants in geometry. You will <u>not</u> be tested on this.