Math 2373, CSE Linear Algebra and Differential Equations, Fall 2018
University of Minnesota, Twin Cities Campus

Homework Assignments thru Week 7
(Stay tuned for updates through Week 13.)

All assignments are from the required text by Farlow, Hall, McDill and West (except for a few “home-made” problems written right on this sheet). Answers to all problems must be justified—unexplained numerical answers will get no credit. Calculations must be done by hand unless you are given specific instructions to do otherwise. Remember that you are practicing up for the exams.

Week 1 homework due Tuesday, Sept. 11

- Sec. 3.2, pp.143–145: 5,6,8,12,13,14,16,19,21,22,26,30,33,34
- Use the row operation notation on p. 134 of the text to explain each step of row-reduction needed to reduce the matrices in problems 12,13,14,16,19,21,22 to reduced row echelon form. In 26,30,33,34 we give you a pass to use the rref command on your calculator, but other that that all work must be done by hand. Furthermore, in answering 26,30,33,34 don’t just discuss solutions—find all of the them. In the case of more than one solution give the answer in the form demonstrated in Ex. 7 on pp. 139–140.

Week 2 homework due Tuesday, Sept. 18

- Sec. 3.1, pp. 127–130: 2,4,5,6,7,12,14,18,22
- Sec. 3.2, pp.143–145: 1,2,4,66 (To do 66 you may use your calculator to calculate rref but then in case of infinitely many solutions you must write out the solution following Ex. 7 on pp. 139–140.)
- Sec. 3.4, pp. 164–167: 1,2,3,4,12,13,16,17,18,39,42 (When/if using row operations, use the notation from p.134 of the text. In 39 and 42, write out the determinants carefully but then you can evaluate them with your calculator.)
- Problem 15 from Sec. 3.4 is not assigned but you must know what it says.
- Sec. 2.2, pp. 70–73: 1,2,6,8,16,18 (We use only the integrating factor method to solve first order linear differential equations in this course.)

Week 3 homework due Tuesday, Sept. 25

- Sec. 3.3, pp. 154–156: 1,2,6,7,8,13,20,21 (Problems 20 and 21 use the important formula \( x = A^{-1}b \) which needless to say you must know.)
- Sec. 3.3: 15 is not assigned but you must know it!
- Sec. 1.1 (No homework is assigned from this section. But you should know the vocabulary in boxed examples 2 and 3, and be familiar with the names of the differential equations in boxed examples 4–8.)
- Sec. 1.2, pp. 20–24: 2,3,13,14,16–21,
- Sec. 1.3, pp. 29–32: 12,14,18,25–30,31,32,34
Week 4 homework due Tuesday, Oct. 2

- Sec. 3.4, pp. 164–167: 46, 50
- The method of 50 also makes quick work of 46.
- Sec. 2.1, pp. 62–63: 1,2,3,4,5,6 (give reasons)
- Sec. 2.2, pp. 70–73: 22,23,29,30
- Sec. 2.3, pp. 77–80: 4,5,6,9,17,31
- Sec. 2.4, pp. 84–87: 2(a,c),3(a,c),6,16,18
- Your answers to the questions in Secs. 2.3 and 2.4 will require a few words (or pictures) of explanation over and above the calculations.
- Home-made: An enormous tank initially contains 400 gallons of water in which is dissolved 50 lbs of salt. Brine containing 4 lbs of salt per gallon enters the tank at the rate of 5 gallons per minute. The well mixed brine leaves the tank at the slower rate of 3 gallons per minute. Find an expression for the number of pounds of salt in the tank at time $t$. (Don’t worry about the tank overflowing.)

Week 5 homework due Tuesday, Oct. 9

Midterm I, Oct. 2

- Sec. 4.1, pp. 205–210: 2,3,4,15,16,17,24,25,26,40,41,42,43
- Your answers to 40,41,42,43 should each be justified by relating numerical details of the IVP to features of the graphs using new vocabulary in Sec. 4.1, e.g., period, circular frequency, and so on.

Week 6 homework due Tuesday, Oct. 16

- Material from Sec. 3.6 is also covered in lab this week and you are responsible for all of this material on exams.
- Sec. 3.6: p. 191: 7–11
- Sec. 4.2: pp. 222–229: 1,2,3,4,5,6,11,12,16,17,18,20,21
- Sec. 4.3: pp. 238–243: 1,2,3,7,11,12,13,16,62
- (Ignore the instruction “give a basis...” in 4.3: 1,2,3,7)

Week 7 homework due Tuesday, Oct. 23

- Sec. 4.4, pp. 253–254: 2,3,5,6,9,11,13,16,21,23,41,44,46
- Sec. 5.3, pp. 324–326: 2,3,4,6,8,11,12,14,20,22,26,30
- Sec. 5.3 notes:
  - Eigenvalues for 5.3: 20 are 1, 2, 3.
  - Eigenvalues for 5.3: 22 are $-1, 0, 0$.
  - Eigenvalues for 5.3: 26 are $-1, 2, 4$.
  - Eigenvalues for 5.3: 30 are 1, 1, 2.