MATH 2373, SPRING 2018
CSE LINEAR ALGEBRA AND DIFFERENTIAL EQUATIONS
UNIVERSITY OF MINNESOTA, TWIN CITIES CAMPUS

(REVISED FROM PREVIOUS SEMESTERS) BY TERRENCE STANLEY

This document is the official listing of homework assignments in Math 2373, Spring 2018. It is subject to (minor) revision during the semester. The most recent update was on December 18th, 2017.

Currently this is the list of the first several homework assignments. It will be updated later to include all assignments for the semester.

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: Due Tuesday, January 23rd:

Sec. 3.2, pp.143–145: 5-9,20,22,29,30. In 29 and 30, specify the solution, to the system, if there is one.

Do not use a calculator for this assignment (well, unless you want to check your answer). Use the row operation notation on p.134 of the text to explain each step of row-reduction. In the case of more than one solution, follow the pattern set in Example 7 on pp. 139–140 of the text.

Home-made problems; Solve the following systems by first writing an augmented matrix, and then using Gauss-Jordan Elimination (using the notation on page 134 for row operations). Be sure to indicate your final answer, do not just stop with the row-reduced matrix.

Problem 1;

$$\begin{aligned} x + 2z &= 5 \\ 3x - 2y + z &= 8 \\ -2x + 2y - z &= -3 \end{aligned}$$

Problem 2;

$$\begin{aligned} x + 2z &= 5 \\ 3x - 2y + z &= 8 \\ -2x + 2y + z &= -3 \end{aligned}$$

Week 2: Due Tuesday, January 30th:

Do not use your calculator for this assignment.

Date: December 19, 2017.

Sec. 3.1, pp. 127–130: 2,12,18,24,26,52

Sec. 3.2, pp.143–145: 2,4,52 (For problem 52, explain this in your own words. Do not just quote something.)

Sec. 3.4, pp. 164–167: 2,13,19,40 (When/if using row operations, use the notation from p.134 of the text.)

Sec. 2.2, pp. 70–73: 2,12 (We use only the integrating factor method to solve first order linear differential equations in this course.)

Week 3: Due Tuesday, February 6th:

Sec. 3.3, pp.154–156: 1,6,10,15,20

Sec. 1.1, pp. 9–11: 2,4 (This section introduces many types of differential equations we will later be studying in detail and introduces important vocabulary.)

Sec. 1.2, pp. 20–24: 4,6,16-21 (for 16-21, just match them up, no reason need be given here)

Sec. 1.3, pp. 29–32:16,19

Home-made problem;

Part a) Does the following function satisfy the given differential equation?. Showing your work is of course essential to answering the question. Be sure to finally answer yes or no and circle it. Do not solve the differential equation, just demonstrate why (or why not) the given function satisfies the differential equation.

$y = f(t) = -3e^{2t} + e^{4t} + 7te^{4t}, \qquad y'' - 6y' + 8y = 14e^{4t}.$

Part b) Does the following function satisfy the given differential equation?. Showing your work is of course essential to answering the question. Be sure to finally answer yes or no and circle it. Do not solve the differential equation, just demonstrate why (or why not) the given function satisfies the differential equation.

$y = f(t) = -3e^{2t} + e^{4t} + 7e^{4t}, \qquad y'' - 6y' + 8y = 14e^{4t}.$

Week 4: Due Tuesday, February 13th:

Sec. 3.4, pp. 164–167: 46, 50 (The method of 50 also makes quick work of 46.) You can use a calculator to multiply matrices.

Sec. 2.2, pp. 70–73: 22,24,26

Sec. 2.3, pp. 77–80: 4,5,20 (start with the differential equation, showing all work)

Sec. 2.4, pp. 84–87: 7,8 (start with the differential equation, showing all work)

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 problem; Frodo, along with his trusty companion Samwise, has taken the ring of power to Mount Doom, in order to throw it into the lava there and destroy it, thus preventing darkness from taking over Middle-Earth (certainly a worthwhile endeavor). The lava is 2000^o Fahrenheit, and the outside temperature is 70^o Fahrenheit, as is the temperature of the ring. After he throws it into the lava (well, actually Gollum falls into the lava with the ring, after struggling with Frodo), in ten minutes the temperature has risen twenty degrees. The melting point of gold is approximately $1,950^o$ Fahrenheit. How long will it take for the ring to melt? (Gandalf has assured us that Newton's law of cooling holds here, after he took a quick trip to the future to check it out.) (The numbers given are for purposes of this problem, and not necessarily realistic).

MidTerm I: Thursday, February 15th; 5–5:55 or 6:05–7pm

Week 5: Due Tuesday, February 20th:

Sec. 4.1, pp. 205–210: 2,4,24,25,47,49

Week 6: Due Tuesday, February 27th:

Sec. 3.6: p. 191: 8,10,11 (You may use your calculator here for row reduction operations)
Sec. 4.2: pp. 222–229: 6,8,14,20
Sec. 4.3: pp. 238–243: 4,8,14,16

Don't worry! The remaining homework assignments will be posted before they are due.