This document is the official listing of homework assignments in Math 2373, Spring 2017. It is subject to (minor) revision during the semester. The most recent update was on January 5th, 2017.

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 24th:**
Sec. 3.2, pp.143–145: 6,7,9,11,14,18,25,26,34,35,73
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.

**Week 2: Due Tuesday, January 31st:**
Sec. 3.1, pp. 127–130: 6,12,14,20,22,52,59
Sec. 3.2, pp.143–145: 6,14,52,62,64
Sec. 3.4, pp. 164–167: 4,6,12,18,40,42 (When/if using row operations, use the notation from p.134 of the text.)
Sec. 2.2, pp. 70–73: 8,14,18 (We use only the integrating factor method to solve first order linear differential equations in this course.)

**Week 3: Due Tuesday, February 7th:**
Sec. 3.3, pp.154–156: 2,6,10,20
Sec. 3.3: 15 is not assigned but you must know it!
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: 2,14, 16—21 (for 16-21, just match them up, no reason need be given here)
Sec. 1.3, pp. 29–32: 12,14
Week 4: Due Tuesday, February 14th:
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: 6,8,20
Sec. 2.4, pp. 84–87: 6,8,16
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.

Week 5: Due Tuesday, February 21st:
Sec. 3.6: p. 191: 8,10,11 (You may use your calculator here for row reduction operations)
Sec. 4.1, pp. 205–210: 4,6,8,26,28,47,49
Sec. 4.2: pp. 222–229: 2,6,8,18,20
(You should know the material from 3.6 that is also covered in lab).

MT I: Thur. February 23rd, 5–5:55 or 6:05–7pm

Week 6: Due Tuesday, February 28th:
Sec. 4.3: pp. 238–243: 2,6,12,14,64

Week 7: Due Tuesday, March 7th:
Sec. 4.4, pp. 253–254: 6,8,10,16,22,26,44,46
Sec. 5.3, pp. 324–326: 2,4,14,22 Resist using a calculator to directly compute eigenvalues and eigenvectors. You can however use your calculator for RREF is that is useful.

Week 8: Due Tuesday, March 21st:
Sec. 1.4, pp. 43–45: 4 (don’t try to find exact solution, and use step size h=0.2)
Sec. 4.6, pp. 270–273: 2,13,22,34
(Problem 34 from Sec. 4.6 has important vocabulary.)
Sec. 5.4, pp. 327–339: 26,30,36,40,42 (do not use your calculator to directly find eigenvalues and eigenvectors, but you can use it for RREF)
Home-made problems: Find matrix powers $A^n$ of the following matrices $A$:
\[
\begin{bmatrix}
1 & 2 \\
2 & 1
\end{bmatrix}
\quad 
\begin{bmatrix}
0 & 2 \\
1 & 1
\end{bmatrix}
\]

Week 9: Due Tuesday, March 28th:
Sec. 6.2, pp.369–370: 12 (no sketch for 12, though), 26,32,40
Sec. 6.3, p. 381: 2,4, (no sketches for 2 and 4), 14,16
Home-made problems: Convert the following IVP’s to two-by-two systems. (You do not have to solve the IVP’s or the systems.)
- $y'' + 2y' + 5y = 7 \cos(t), y(0) = -3, y'(0) = 1$
- $y'' + 4y' + 4y = 3te^{-2t}, y(0) = 5, y'(0) = 2$
- $y'' + 3y' + 2y = t^2 + 1, y(0) = 2, y'(0) = -4$
- $2y'' + 10y' + 12y = 4t \sin(3t), y(0) = 1, y'(0) = -2$

MT II: Thur. March 30th, 5–5:55 or 6:05–7pm
Week 10: Due Tuesday, April 4th
- \$6.7, pp. 418–419: 4,6,10
- Rather than follow the instructions in the textbook, solve problem 10 of \$6.7 by again using the method of undetermined coefficients.
- \$8.1, pp. 474–475: 4,6,14,16,18,42,44,50

Week 11: Due Tuesday, April 11th
- \$6.5: p. 401: 6,8,12,18 (You can now use your calculator to directly compute eigenvalues/vectors if you wish)
- \$8.2: pp. 483–484: 2,8,10
- \$8.3: pp. 496–500: 2.4, 21,23,25
- Instead of following the textbook instructions for 23 you are instructed to rewrite the given functions as a “function-in-pieces” and to sketch its graph.

Week 12: Due Tuesday, April 18th
- \$8.3: pp. 496–500: 10,12,16,34,36,50
- \$8.5, pp. 516–517: 2,8

Week 13: Due Tuesday, April 25th
- Home-made problem 1: Use Laplace transforms to solve the following:
  \[ y'' + 4y' + 29y = 96(t - 1), \ y(0) = 0, \ y'(0) = 1. \]
- Home-made problem 2: Use Laplace transforms to solve the following:
  \[ y'' + 4y' + 3y = 10H(t - 7), \ y(0) = 3, \ y'(0) = -8. \]
- Home-made problem 3: Use Laplace transforms to solve the following:
  \[ y'' + 2y' + 5y = 50H(t - 3), \ y(0) = -1, \ y'(0) = 7. \]
- \$8.5, pp. 516–517: 10
- \$9.1, pp. 530-532: 4,6,36,46
- Home-made problem 4: Use Laplace transforms to solve the following initial value problem:
  \[ x'' = -22x + 6y, \ y'' = 6x - 17y, \]
  \[ x(0) = 0, \ y(0) = 0, \ x'(0) = 1, \ y'(0) = -2. \]

Midterm III, Thursday, April 27th, 2017, 5:00–5:55 or 6:05–7:00