

## Math 20750, Spring 2016

### Tips for Studying for the Final

The exam is Thursday, May 5, at 8 a.m. in 229 Hayes-Healy. It will cover Chapters 1, 2, 4, 6 and 8 and Sections 3.1–3.3, 9.1–9.4, 9.6–9.7, 9.9, and 10.1–10.2 in Polking, Boggess and Arnold and Chapters 1–5, 7–9, 11 and 14 in *Differential Equations with MATLAB*<sup>®</sup>. You may bring a summary (both sides of a  $8\frac{1}{2}'' \times 11''$  sheet of paper in your handwriting) to the exam and a calculator. However, I will ask you to please turn off and put away all cell phones, laptops, tablets and other electronic devices.

Since you are allowed to bring in notes, I am not testing your ability to memorize formulas, algorithms, rules, etc. As you know by now, it is easy to get a computer to solve many ODEs. That means that the ability to do computations by hand is much less important. An understanding of the theory, an ability to tell whether computer output is reasonable, and the ability to interpret the output is very important.

I also assume that you learned techniques of integration in second semester calculus, got good at doing them when you did multiple integrals in third semester calculus (if you weren't already good at them), and refreshed your ability to do them on homework problems in this course, so I don't need to test your ability to carry out a skill you learned long ago.

The exam will be similar in format to Exams 1 and 2 and will emphasize material covered since Exam 2. I won't ask you to compute a numerical solution—that is best done by computer. On a problem which requires doing computations, be sure to check your computations when possible. *There will be no partial credit for an incorrect answer on a routine problem unless you make a serious attempt to check your answer.* If you check and find your answer isn't correct but can't find the mistake, say that. Some of the problems will require an understanding of theory, or be a lot easier if you do understand some theory.

How can I test your ability to tell whether computer output is reasonable and if so, to interpret it? There will be at least problem in which you are shown a MATLAB session which has the MATLAB input and output but no comments. The session will have some relationship to the lengthy MATLAB problems you have done. You will be asked a question or questions connected with the session. How can you study for such problems? Make sure you understand how to answer *all* the questions you were asked on the MATLAB problems from Problem Sets B, C, D and F. If you were just shown the MATLAB input and output, would you be able to answer all the questions? Would you be able to tell what the point of the MATLAB session was? Cover up all the comments and explanations and just look at the input and output. See how much you can figure out about what the problem was and what information is contained in the MATLAB output. Now go back and look at the problem. Answer any questions you haven't already answered.

### Suggested review problems

If you are looking for review problems on the material not covered on Exams 1 and 2, here are some from Polking, Boggess and Arnold: §4.1 #17, §4.3 #25,29,31, §4.4 #11,13, §4.5 #19,21,23,27, §4.6 #7, §4.7 #17, §9.9 #3, §10.1 #5,13, §10.2 #1.

Also solve  $y'' + 144y = \cos 11t$  and  $y'' + 144y = \cos 12t$  with the initial conditions  $y(0) = 0$ ,  $y'(0) = 0$ . Describe the behavior of the solutions. What makes the two problems different?