

Review Sheet for Final

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The exam will be open book, open notes, any calculator. It will have no more than 10 questions.

This document basically reports what I said in class on Friday. I don't think there's anything major in it that I didn't say then.

You might want to look at this on Sunday evening to see if I have added any additional remarks (I will tell you here at the top if there are any revisions).

Chapter 1: We all know this stuff. No questions on it.

section 2.1: There will be question(s) testing your understanding of what it means for a function (or a vector of functions) to be a solution of a differential equation or initial value problem (or system of such).

section 2.2: Separable equations will be covered. Make sure that you get singular solutions as well as the general solution.

section 2.3: No questions about this.

section 2.4: There will be question(s) about linear equations.

section 2.5: There will be a mixing problem, but it will really be a 9.2 question.

section 2.6: I'm not going to cover this.

section 2.7: I might ask some kind of question about existence and uniqueness – I'm not sure.

section 2.8: I'm not going to cover this.

- section 2.9:** This is fair game – it’s related to 9.3.
- chapter 3:** The modelling question will be an electric circuit question, and it will really be from chapter 4 – it will be second-order.
- sections 4.1, 4.2:** No special attention to these sections.
- section 4.3:** You need to be able to solve second order homogeneous linear equations with constant coefficients by the method described here, as well as initial value problems of this kind.
- section 4.4:** The electric circuit problem may be of this kind – I’m not going to ask for more than the solution to an equation (none of the special terminology here will be covered).
- section 4.5, 4.6:** You should be able to solve second-order linear equations with forcing terms using the method of undetermined coefficients or variation of parameters.
- section 4.7:** The electric circuit problem might be of this kind.
- section 5.1:** I’m not going to ask you to compute Laplace transforms from the definition.
- section 5.2, 5.3:** You should be able to use these basic properties to find Laplace transforms and inverse Laplace transforms in order to solve differential equations and initial value problems – that’s the extent of it. If I have room for an easy question I might ask you to derive a few transforms or inverse transforms.
- section 5.4:** You will be asked to solve initial value problems using transforms. There might be an extra credit problem where you solve a system of equations (chapter 9 stuff) using transforms.
- section 5.5:** There will be an initial value problem to solve with a discontinuous forcing term.
- section 5.6:** This will not be covered. No delta functions.
- section 6.1, 6.2:** I might or might not cover this. If I have room for an easy question, I might ask an Euler’s method question.

chapter 7: I am not inclined to ask questions about chapter 7 content alone, although I suppose I might (look at questions I asked on test 4 for examples). I think you'll get enough of a workout on this material doing chapter 8 and 9 material.

chapter 8: You should know about the use of the Wronskian to test for linear independence. You should know how to check whether given functions are solutions of a given equation or initial value problem. This is not the same thing as solving the equation or initial value problem!!! Given a basic set of solutions to a linear equation, you should be able to find a solution satisfying given initial conditions.

sections 9.1, 9.2: Be able to solve these problems by the method of eigenvectors and eigenvalues. Notice that the case of one real eigenvector (the one we didn't cover on test 4) will appear on this test.

section 9.3: I'm interested in the classification of different kinds of equilibrium points. I might ask for explicit calculations telling me what kind of equilibrium point a system has.

I might ask you to sketch a few arrows in the direction field of a system of equations, with supporting calculations.

section 9.8: Be able to solve systems of two linear equations with constant coefficients with forcing functions, either by variation of parameters or using the method of undetermined coefficients. I will supply the solutions to the corresponding homogeneous equation.