MTH 240-001 Final Exam Information

The 100-point final exam will be made up of two parts: a 50-point take-home portion and a 50-point in-class portion. The take-home portion will be available Friday, May 5, and it will be due Thursday, May 11. The in-class portion is scheduled for our last day of class (Thursday, May 11).

The in-class portion of the test will focus exclusively on the course outcomes (from the syllabus):

1. classify differential equations and determine appropriate methods of solution;
2. solve ordinary, linear equations with constant coefficients; and
3. solve a damping problem via a 2nd-order ordinary differential equation.

In general, final exam problems will be chosen from the list of topics below.

Skills list for the final exam

1. Solve 1st-order separable equations. (Section 1.4)
2. Solve 1st-order linear equations. (Section 1.5)
3. Solve exact differential equations. (Section 1.6)
4. Use basic substitutions to solve differential equations, including Bernoulli equations, homogeneous equations, and 2nd-order equations reducible to 1st order. (Section 1.6)
5. Solve application problems involving separable equations, especially those involving exponential growth/decay and Newton's law of cooling. (Section 1.4)
6. Solve application problems involving linear equations, especially those involving mixing. (Section 1.5)
7. Solve 2nd-order, constant-coefficient, homogeneous, linear ODE's. (Sections 2.1-2.3)
8. Use the method of undetermined coefficients to solve 2nd-order, linear, constant-coefficient, non-homogeneous equations. (Section 2.5)
9. Find the equation of motion for a mass in a free, damped or undamped, mass-spring system. Write the equation of motion in terms of a single sine or cosine with a phase shift. (Section 2.4)
10. Use a power series centered at an ordinary point to solve a 1st or 2nd-order ODE. (Sections 3.1-3.2)
11. Use a table to determine the Laplace transform of a function. (Section 4.1)
12. Use the linearity property of the Laplace transform. (Section 4.1)
13. Use a table to determine the inverse Laplace transform of a function. (Section 4.1)
14. Use Laplace transform methods to solve initial value problems. (Sections 4.2-4.3)
15. Use properties of Laplace transforms to find transforms and inverse transforms. (Section 4.4)
16. Use Laplace transform methods to solve equations whose coefficients are not constants. (Section 4.4)
17. Determine the Fourier series of a function of period $2L$. (Section 8.2)
18. Determine the convergence properties of a Fourier series. (Section 8.2)
19. Determine the Fourier sine or cosine series of a function. (Section 8.3)
20. Use separation of variables to solve the heat equation with Dirichlet or Neumann boundary conditions. (Section 8.5)