

MATH 251 FALL SEMESTER 2008
Final Exam study guide

Exam Date/Time: Wednesday, December 17, 12:20 to 2:10 pm

Format: 150 points -- 13 x multiple-choice, 6 true or false, and 4 x partial-credit

The exam is cumulative, with approx. 50% based on new (chapters 9 & 10, but mostly chapter 10) material.

Location: 100 Thomas (sections 1, 2, 5, 6, 8, 9, 10, 11), 104 Keller (sections 3, 4, 7)

A table of Laplace transforms (a copy of table 6.2.1 from the textbook) will be provided during the exam.

Topics to study

All the topics from the midterm exams:

http://www.math.psu.edu/tseng/class/Math251/MATH251_FA2008_exam_1_guide.pdf

http://www.math.psu.edu/tseng/class/Math251/MATH251_FA2008_exam_2_guide.pdf

Plus,

1. Nonlinear system: type and stability of its critical points
2. Separation of variables
3. Two-point eigenvalue problems; finding eigenvalues / eigenfunctions
4. Fourier series; Euler-Fourier formulas
5. The Fourier Convergence Theorem
6. Even and odd functions; Even and odd periodic extensions
7. Solution of heat conduction problems (w/ different boundary conditions)
8. Steady-state solution of the heat conduction equation
9. Wave equation: vibration of a fixed-end elastic string

The topics below are explicitly NOT covered on the final exam:

- a. Mixing/Compound interest/air resistance problems
- b. Reduction of order
- c. Undetermined coefficients method
- d. D'Alembert solution of the wave equation
- d. Laplace/potential equation (section 10.8; note that this topic is different from Laplace transforms, which will be on the exam)

Comments: Students should know basic integration techniques; partial differentiation; the general long-term behavior of different types of solutions; the behavior of the solutions of various types of mass-spring systems; stability/ phase portrait classifications; Laplace transforms; computing Fourier coefficients and determine the convergence of Fourier series; and each of the steps used to solve a second order linear PDE initial-boundary value problem.