Math 216-01

Final Exam Information

The final exam is Wednesday, December 9, 1pm–2:50pm, in Room 2625. Special office hours during finals week:

- Monday, December 7: 9:00am–10:30am
- Tuesday, December 8: 10:00am–12:30pm
- Wednesday, December 9: 9:00am–10:00am

Skills Checklist

1. Verify that a given function is a solution of a differential equation (DE).
2. Determine the order of a DE. Determine whether a DE is ordinary or partial. Identify a DE's dependent variable and independent variable(s). Determine whether a solution is implicit or explicit.
3. Classify and solve first order ODE's that are separable, exact, linear, Bernoulli, exact after integrating factor, or homogeneous.
4. Solve DE application problems such as growth/decay or mixing.
5. Find the orthogonal trajectories for a one-parameter family of curves.
6. Use Euler's method (by hand) to approximate the solution of an ODE.
7. Derive and use the recursive Taylor method of order 2 or 3 for an ODE.
8. Understand the theory of 2nd-order linear ODE's:
   (a) Initial value problems have unique solutions.
   (b) Homogeneous equations have two linearly independent solutions.
   (c) Linearly independent solutions (homogeneous case) have a nonzero Wronskian.
   (d) General solution of homogeneous case is $y(x) = c_1 y_1(x) + c_2 y_2(x)$.
   (e) Superposition principle
   (f) General solution of nonhomogeneous case is $y(x) = c_1 y_1(x) + c_2 y_2(x) + y_p(x)$.
9. Solve 2nd-order, constant-coefficient, homogeneous, linear ODE's.
10. Solve higher-order, constant-coefficient, homogeneous, linear ODE's.
11. Use undetermined coefficients to solve 2nd-order, constant-coefficient, nonhomogeneous, linear ODE's.
12. Use variation of parameters to solve 2nd-order, nonhomogeneous, linear ODE's.
13. Solve 2nd-order Cauchy-Euler equations.

14. Set up and solve problems involving one-mass/one-spring systems.
15. Determine whether a mass-spring system is underdamped, overdamped, or critically damped.
16. Solve a system of constant-coefficient linear ODE's.
17. Use the definition to compute a Laplace transform.
18. Use tables to determine Laplace transform.
19. Use tables to determine inverse Laplace transforms.
20. Use Laplace transforms to convert an ODE to an algebraic equation.
21. Use the inverse Laplace transform to retrieve the solution of a converted ODE.