MAE384 Fall 2009 Final Exam - December 10, 2009 9:50-11:40 AM
Open book, No laptop Allowed: Basic calculator with no programming/graphics functions

Key sections and slides (★ = most important)

Ch 6 Numerical differentiation

6.2 Basic concept of finite difference approximation
★6.3-6.4 Derivation of finite difference schemes by Taylor series expansion
6.10 Numerical partial differentiation

Ch 7 Numerical integration

7.2 Rectangle/Mid-point methods
★7.3 (Composite) Trapezoidal method
★7.4 (Composite) Simpson's 1/3 and 3/8 methods (Focus on how to use the methods)
7.5 Gauss quadrature

Ch. 8 Initial value problem

★8.2 Euler's explicit method, Euler's implicit method (Skip sub-section 8.2.2)
★8.3 Modified Euler's method (which is a 2nd order Runge-Kutta method)
★8.5 Runge-Kutta methods (Focus on the 3rd order and 4th order R-K methods; sub-section 8.5.2, 8.5.3)
8.6 Multi-step methods
8.13 Numerical stability

Ch. 9 Boundary value problem

★9.3 Finite difference method (matrix formulation)
★Slides for BVP; More examples on finite difference method

Introduction to partial differential equation

★PDE Slides (II) Method of separation of variables (First two examples only)
★PDE Slides (III) Case 2: Numerical solution for PDE with an open domain
★PDE Slides (III) Case 1 + Slides (IV): Numerical solution for Laplace equation with a closed domain

Likely distribution of # of questions

Ch. 6 1-2
Ch. 7 1
Ch. 8 1-2
Ch. 9 1
PDE 1-2

Total 5-6

Note: Expect a format similar to our midterm. Most of the problems will not require time-consuming computations but a calculator with basic math functions (sin, cos, exp, ln, $\sqrt{x}$, x^y, etc.) will be very useful. Make sure to bring one.