MATH 471, Fall 2009, Numerical Methods, Section 2

Instructor: Robert Krasny, 4830 East Hall, (734)-763-3505, krasny@umich.edu
Class Time/Location: MWF 2-3pm, 1084 East Hall
Office Hours: M 4-5pm, Tu 12-1pm, and by appointment

Textbook: "A Friendly Introduction to Numerical Analysis", by Brian Bradie,
                  ISBN 0-13-013054-0, Pearson Prentice Hall

Prerequisites: differential equations (e.g. Math 216, 256, 286, or 316)
                        linear algebra (e.g. Math 217, 417, or 419)

Course Website: www.math.lsa.umich.edu/∼krasny/math471.html

Math 471 is a survey of numerical methods for science and engineering. A numerical method is an algorithm, or a sequence of steps, for solving a set of equations. These can be linear equations, nonlinear equations, or differential equations. We will study the accuracy, stability, and efficiency of the some of the basic methods. Scientific problems were traditionally investigated by theory and experiment, but now computer simulations are also being used in problems such as airplane design, weather prediction, modeling the spread of an epidemic, and improving the efficiency of solar cells, to cite just a few examples. There are software packages that can be used as a black box, but in this course we'll look under the hood and see how the methods work.

Syllabus
   floating-point arithmetic (1.3-1.4)
   nonlinear equations and root-finding (2.1-2.7)
   numerical linear algebra (3.1-3.10)
   two-point boundary value problems (8.1-8.2)
   Poisson equation on a square with Dirichlet boundary conditions (9.1)
   eigenvalues (4.1-4.2)
   polynomial and spline interpolation (5.1-5.7)
   numerical integration (6.3-6.7)
   initial value problems for ordinary differential equations (7.1-7.5)

Exams
   Midterm Exam: Friday, October 30, in class
   Final Exam: Wednesday, December 23, 10:30am-12:30pm, room tba

Grading Policy: midterm = 20%, final exam = 40%, homework = 40%

Homework Policy: Homework will be assigned every 1-2 weeks. Some problems will require programming, for which Matlab is recommended. Students are encouraged to discuss the problems with each other, but each student should write up and submit their own solution set. The presentation should be neat and legible. Please staple the sheets together.

Other Class Policies
1. Questions are encouraged in class (and outside class too!).
2. Please - no cellphones, eating, reading newspapers, or web surfing in class. Thank you!