

**Math 5600 Take Home Final Exam**  
(due 9:00a.m. April 24 in my mailbox in 228 JWB)

**Note:** For computational problems include the detailed output of your computations. For theoretical problems show your work. No credit will be awarded if the work is not shown.

**1** (c,10 points)

Use Runge-Kutta order 4 method to solve Problem 1(c), page 280. Plot the difference between the exact and numerical solutions for  $1 \leq t \leq 2$ .

**2** (th,10 points)

Problem 8, page 334.

**3** (th,10 points)

Show that the implicit trapezoidal method is A-stable.

**4** (c,10 points)

Problem 3(a), page 665.

**5** (c,10 points)

Problems 1(a), 2(a), page 715. Output the difference between the exact and numerical solutions at  $t = 0.1$  for both backward-difference and Crank-Nicholson methods. Which method gives a better approximation to the exact solution of the PDE?

**6** (c,10 points)

Use iterative refinement algorithm to solve Problem 2(f), page 463 with 4-digit rounding arithmetic.

**7** (th,10 points)

Problem 8, page 86.

**8** (c,10 points)

Problem 7, page 140.

**9** (th,10 points)

Problem 22, page 178.

**10** (th,10 points)

Problem 8, page 184.