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.