MA780, sec 001, test 3, April 23, 2010

**DIRECTIONS:** There are 70 points on this part of the text. The other 30 will come from the take-home part.

Write your answers on your own paper. **Use only one side of the paper.** When you have completed the exam, fold your papers lengthwise and **PRINT** your name on the outside.

You have until the end of the class (10:00) to complete the test.

1. (10 points) How are the Adams and BDF methods constructed? I’m not asking for the formulae, but only for the general idea of how they’re derived.

2. (30 points)
   (a) What is a PECE method?
   (b) Take one step of the AB1-AM1 (forward Euler - backward Euler) predictor-corrector pair for the equation
   \[ y' = \lambda y. \]
   (c) What is the stability region for the AB1-AM1 PECE method?

3. (30 points) Consider the the multistep method
   \[ u_{n+2} = -4u_{n+1} + 5u_n + 4hf(u_{n+1}) + 2hf(u_n). \]
   (a) Is this method consistent? If so, what is its order?
   (b) Is this method stable?