MATH 273: NEW Topics for Final Exam

1 ALGORITHMS

Differential Equations
Methods for initial value problems:

1. Euler
2. Backward Euler
3. Runge-Kutta (formula pair)
4. Adams (predictor-corrector)
5. Backward Differentiation Formulas (with Newton corrector)

Know what each algorithm is used for and how it works; be prepared to carry out the steps of an algorithm (with perhaps the help of a calculator) in simple cases.

2 ANALYSIS

1. Truncation error and global error of ODE methods
2. Comparison of methods for ODE's
3. Diagnosis of stiffness

Know what the analysis (presented in the book or discussed in class) says about each of the algorithms above. Be prepared to apply that analysis in specific cases.

3 SOFTWARE

1. Convert higher-order ODE to first-order system
2. Vectorization!
3. Appropriate tolerances

Be familiar with these computing concepts as they are realized in MATLAB. Be prepared to deduce what a given fragment of MATLAB code does, and be able to modify or extend it to produce a required different result.

4 Bring to the Exam

1. Sharpened pencil(s), blank paper
2. Textbook **required**
3. A calculator will be helpful