Chapter Review Sheets for
Elementary Differential Equations and Boundary Value Problems, 8e

Chapter 8: Numerical Methods

- Definitions and Algorithms:
- Convergence
- Global truncation error
- Local truncation error
- Round-off error
- Euler method, backward Euler method
- Improved Euler method (Heun formula)
- Modified Euler formula
- Runga-Kutta method
- Adaptive methods
- One-step method Multi-step method, Predictor-corrector method, Adams-
- Bashforth formula, Adams-Moulton formula, Backward differentiation formulas
- Stability
- Stiff Problems

Theorems:

- None

Important Skills:

- Use a particular method with specified step size to compute approximate solutions to ODE's.
- Euler Method (Example 1, p.443); Backward Euler Method (Example 2, p.445)
- Improved Euler Method (Example 1, p.453)
- Runga-Kutta Method (Example 1, p.459)
- Predictor-corrector method, Adams-Bashforth formula, Adams-Moulton formula (Example p.465)
- Backward Differentiation Method (Example 2, p.466)
- Use numerical methods to find approximate solutions to systems of ODE'S. (Example 1, p.479)
- Observing large errors of approximation for Euler's method (Example 1, p. 469)
- Use numerical methods to find approximate solutions to stiff ODE's (Example 2, p. 473)

Relevant Applications:

- Any of the applications previously mentioned, where analytical solutions cannot be found, or for which finding analytical solutions are too costly.