**CIVE 498/898 – Section 3**

**Computational Problem Solving in Civil Engineering**

Assignment 8– Due Wednesday, November 28 2012, at 1:00pm

Solutions on http://www.scribd.com/doc/32054221/Chapra-Applied-Numerical-Metho

**Problem 1**

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**Problem2**

Solve the following problem over the interval from x=0 to 1 where y(0)=1. Display all your results on the same graph.

1. Analytically .
2. Euler’s method by hand (h = 0.25)
3. Fourth-order RK method by hand (h=0.5)
4. Develop a MATLAB program/function for fourth-order RK, and compare it with the answer from (c).

**Problem 3.** Given:

If x1(0)=x2(0)=1, obtain a solution from t=0 to 0.2 using a step size of 0.05 with the (a) explicit and (b) implicit Euler methods.

Note: you may use MATLAB to help with matrix operation or solving linear equation systems.

**Problem 4.** The following system is a classic example of stiff ODEs that can occur is the solution of chemical reaction kinetics:

Solve these equations from t=0 to 50 with initial conditions c1(0)=c2(0)=1 and c3(0)=0. Using:

1. A MATALB function for standard ODE (e.g. ode45)
2. A MATLAB function for stiff ODE (e.g. ode23s)