

NUMERICAL ANALYSIS

Sample Test 4

Math 4365 (Spring 2012)

April 10, 2012

- 25 points 1. Apply the Linear Shooting method to solve

$$\begin{aligned}y'' &= 4(y - x), \quad x \in (0, 1), \\y(0) &= 0, \quad y(1) = 2\end{aligned}$$

and write down the detailed algorithm using the 4th order Runge-Kutta method.

- 25 points 2. Apply the Nonlinear Shooting method to solve

$$\begin{aligned}y'' &= -(y')^2 - y + \ln x, \quad x \in (1, 2), \\y(1) &= 0, \quad y(2) = \ln 2\end{aligned}$$

and write down the detailed algorithm using the 4th order Runge-Kutta method.

- 25 points 3. Apply the Linear Finite-Difference method to solve

$$\begin{aligned}y'' &= 4(y - x), \quad x \in (0, 1), \\y(0) &= 0, \quad y(1) = 2\end{aligned}$$

and write down the detailed algorithm.

- 25 points 4. Apply the Nonlinear Finite-Difference method to solve

$$\begin{aligned}y'' &= -(y')^2 - y + \ln x, \quad x \in (1, 2), \\y(1) &= 0, \quad y(2) = \ln 2\end{aligned}$$

and write down the detailed algorithm using the Newton method.