

NEEP 602 -- Engineering Problem Solving II
Spring 2005
Homework 4

Label your figures and charts; plot the analytical solutions on the same charts and figures for comparison. Use large numbers of meshpoints in your Matlab solutions, and comment your scripts.

8. Boundary Value Problem (10 points)

Use both Excel and Matlab to solve the BVP. Compare your numerical solutions with the analytical solution.

$$xy'' + 2y' - xy = e^x$$

The boundary conditions are

$$y(0) = 0.5, y(2) = 3.695428$$

The analytical solution is

$$y = e^x / 2$$

9. BVP involving first derivative BC (10 points)

Use both programs to solve the following boundary value problem. Compare your solution with the analytical solution.

$$\begin{aligned} \frac{d^2 y}{dt^2} + 9y &= 0 \\ y(0) &= 1 \\ \frac{dy}{dt}(\pi) &= 2 \end{aligned}$$

The analytical solution is:

$$y = -\frac{2}{3}\sin(3t) + \cos(3t)$$