

BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, PILANI HYDERABAD CAMPUS
MATH F444:NUMERICAL SOLUTIONS TO ORDINARY DIFFERENTIAL EQUATIONS
First Semester, 2015–16
ASSIGNMENT-1

1. Write the MATLAB code to a second order accurate finite difference method to solve the following two point boundary value problems
 - (i). $Y'' = \frac{-2x}{1+x^2}Y' + Y + \frac{2}{1+x^2} - \log(1+x^2) \quad 0 < x < 1$
 $Y(0) = 0; Y(1) = \log(2)$ (Exact solution : $Y(x) = \log(1+x^2)$).
 - (ii). $Y'' = Y + 6x - x^3; Y(0) = 0, Y'(1) = 3$.
 - (iii). $Y'' + Y = \sin(3x); Y(0) + Y'(0) = -1, Y'(\frac{\pi}{2}) = 1$.
2. Compare (graphically) the numerical solution with exact solution for different values of h for the given BVP's.
3. Tabulate the global error in max norm in the approximate solution for different step sizes $h = \frac{1}{2^k}, k = 1, \dots, 6$ and verify the rate of convergence of the finite difference method.