MTP 290
PROBLEM SET 10

(1) Use Euler's Method and Runge-Kutta method of order 4, with $h = 0.1, \& \ h = 0.01$ to find the approximate value of $y(b)$ for the following initial value problems:

$$
\begin{aligned}
&(a)\ y' = 2y - 3x, \qquad y(0) = 1,\ b = 0.2,\\
&(b)\ y' = \sin(y), \qquad y(0) = 1,\ b = 0.5,\\
&(c)\ y' = y + 8y^2 - 9y^3, \quad y(0) = 0.5,\ b = 1,\\
&(d)\ y' + 2y = 2 - e^{-4x}, \quad y(0) = 1,\ b = 0.5.
\end{aligned}
$$

(2) Use finite difference method to solve the following boundary value problems with $n = 4,\ 8$:

$$
\begin{aligned}
&(a)\ y'' = 6x, \quad y(0) = 0,\ y(2) = 8,\\
&(b)\ y'' = 24x^2, \quad y(0) = 0,\ y(2) = 32,\\
&(c)\ y'' + y = 1, \quad y(0) = 1,\ y(\pi/2) = 0.
\end{aligned}
$$

Also, plot the discrete solution.

(3) Explore built-in functions of MATLAB for the various numerical methods which we have studied through out this course. You can make use of 'help' and 'doc' commands of MATLAB to learn more about inbuilt functions.