Assignment - 8

1) Use Euler's method to numerically solve the following equation.

$dy/dx = -2x^3 + 12x^2 - 20x + 8.5,$

from x=0 to x=4 with step size 0.5, 0.25, 0.1 and 0.05. The initial condition is y=1 at x=0.

Compare your result with the exact solution. Exact solution is

$y = -0.5x^4 + 4x^3 - 10x^2 + 8.5x + 1$

Info: As discussed in the class, generate the data points at each step and write them in an output file as two cols. Then generate another set of data for the exact solution with step =0.01. Then plot all the data sets together using gnuplot.

Gnuplot is a plotting software used in Linux OS. As all the machines in the lab are based on linux, you can use gnuplot there.

Commands for gnuplot.

Open a terminal and type gnuplot. You will see the gnuplot command prompt. Then type the command

plot "outputfile" using col1:col2 with linepoint

In short you can write

p "outputfile" u 1:2 w lp

To plot more than one file, e.g. 3 output files then you have to type

p "output1" u 1:2 w lp, "output2" u 1:2 w lp, "output3" u 1:3 w lp

If you don't want line and points together then type

p "output" u 1:2 w l