Tutorial 9

1. Solve the differential equation $dy/dx = x^2y - 2y$ with $y(0)=1$ over the interval $x=0$ to 0.5, using (a) Heun's method without iteration with $h=0.25$ and 0.125, (b) Heun's method with iteration (with $h=0.25$ and stopping error criterion of 1%), and (c) 4^{th} order Runge-Kutta method with $h=0.125$ and 0.25. Obtain the exact value of y at $x=0.5$ and perform an error analysis.

2. Solve the differential equation $dy/dx = 10 \sin(\pi x)$ with the initial condition $y(0)=0$ and step length of 0.2 using (a) the 4^{th} order R-K method, (b) the Milne's method and (c) 4^{th} order Adams method to obtain the value of y at t=0.2, 0.4, 0.6, 0.8 and 1.0. (For the multi-step methods use the values obtained from the R-K method for start-up)