Assignment 1

for NeuroComputing/ Theoretical Neuroscience 2014

a. Write a program that multiplies two random matrices of rank 1000. This program should use two different implementations. In one implementation you should use the Matlab operator `*', and in the other you should component-wise calculations (use explicit loops over the specific indices of the matrices to calculate the resulting matrix). Your program should report the elapsed time for both methods by using the Matlab commands **tic** and **toc**. (4 points)

b. Given is the following ODE: $\tau\, dx/dt = -x$ with initial condition $x(0)=1$ and time constant $\tau=5$. Write a program that plots the difference between the analytic solution and the numerical solutions using the Euler method and the Runge-Kutta method (function ode45 in Matlab). (3 points)

c. Modify the simulation program for a synapse (program EPSP.m) to show the time course of the EPSP when the synapse is stimulated with neuro-transmitters every 20 ms. (2 points)

Please submit one Matlab programs that can be executed to and reports all answers (2 elapse times and two figures). Submit this program as attachments to prof6508@cs.dal.ca. The email must have a subject line `A1' and must be received by Thursday, **Jan 23 before 4pm**.