# Project 1

## for NeuroComputing/ Theoretical Neuroscience 2016

a. 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 two curves with 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)

b. 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)

c. Use the Hodgkin–Huxley program to plot the current-response (activation) function as shown in Figure Fig. 2.11 in the textbook both with and without noise. (4 points)

Please submit one Matlab program that can be executed to create all the figures for the questions. Make sure to include sufficient labels in the plot to understand what is plotted. Submit this program as attachments to NeuroCompDal@gmail.com. The email must have a subject line `P1' and must be received by Friday, **January 22 before midnight**.