Psy 4/596L - Homework2

- Q1:
  ➢ Using the simpleneuron model: Record the membrane potential (type 'RecordMEMPOT(0)'). Run the model for 10 seconds (spontaneous activity). Use SaveMEMPOT() to save the voltage values of the simulation.

Compute the mean and standard deviation of the membrane potential and compare with (Pare et.al. 1998).

- Q2: Write a function that takes a spike train and returns the firing rate, the CV and the CV2.

- Q3:
  ➢ Increase the level of noise of the model (in the shell, type 'neurs[0].noise.g_e0=0.02').
  ➢ Record the action potentials of neuron 0 (type 'RecordAP(0)').

Run the Neuron model for 150 seconds (spontaneous activity). Use SaveAP() to save the times of the action potentials. Compute the cumulative firing rate, cumulative CV and cumulative CV2. Plot the CV2 Vs mean ISI (see Holt et al. 1996, fig 2). What do you see?

- Q4 (optional):

Generate 2000 spikes Poisson distributed at 20 Hz with a 4 ms absolute refractory period. Modify the spike train to produce as '**strange**' of a return map as possible. Plot the return map and a sample of the spike train. Make sure to explain the features of the map, and how they relate to the modifications you introduced.