**Hodgkin-Huxley Homework**  
Due October 8, 2019.

1. Fix T0=100 and I0=7, simulate the HH model, and plot the results. You'll observe the neuron generates action potentials (or spikes). Focus on one of these spikes, and plot each of the variables (V,m,h,n) versus time. Use these plots to describe in detail how each gating variable evolves during a single spike. Use these results to describe how Na+ and K+ ions flow in / out of the neuron during a spike. This is the \*most\* important model in computational neuroscience. Understand it deeply, and you'll have an intricate sense for the biophysical mechanisms of action potential generation.
2. Find the spike threshold for the model neuron. In other words, how much current must we inject to generate a spike? How sensitive is this threshold to changes in the injected current?
3. Determine how the firing rate of the HH model varies with input current I. Make a plot of the firing rate vs I (the “f-I curve”).
4. Use the auxiliary functions in the code HH0.m to plot the time constants of each gating variable versus the voltage. To do so, use the expression we wrote in class:  
    tauX[V] = 1/(aX[V] + bX[V])

where "X" is "M", "H", or "N". Plot "tauX[V]" versus "V" for each gating variable and describe your results. Show that, indeed, the Na-activation variable is the \*fastest\*?