

## 7.012 Section problem: Neurobiology

a) The resting membrane potential of the cell is due primarily to the action of two membrane protein complexes.

i) Fill in the table below with the names of these two protein complexes, the ion(s) that move through each protein complex, and the direction each ion moves through the complex to establish the concentration gradient.

protein complex	ion(s) moved	direction

ii) How do these complexes work in concert to establish the resting membrane potential?

b) The depolarization and repolarization associated with an action potential is due primarily to the action of two other membrane protein complexes. Fill in the table below with the name of these two protein complexes, the ions that move through each protein complex, and the direction each ion moves, and whether this causes a depolarization or a repolarization

protein complex	ions moved	direction	depolarization or repolarization

c) If you increase  $K^+$  ion concentration outside the neuron, how would the resting membrane potential change? Why?

d) Would the above change make the neuron more or less likely to fire an action potential? Why?

e) When an action potential invades the terminus of the pre-synaptic cell, the electrical signal is converted to a chemical signal. At the post-synaptic cell, this chemical signal is transduced back into an electric signal.

i) How is the electric signal converted to a chemical signal in the pre-synaptic cell?

ii) How is this chemical signal transduced back into an electric signal in the post-synaptic cell?