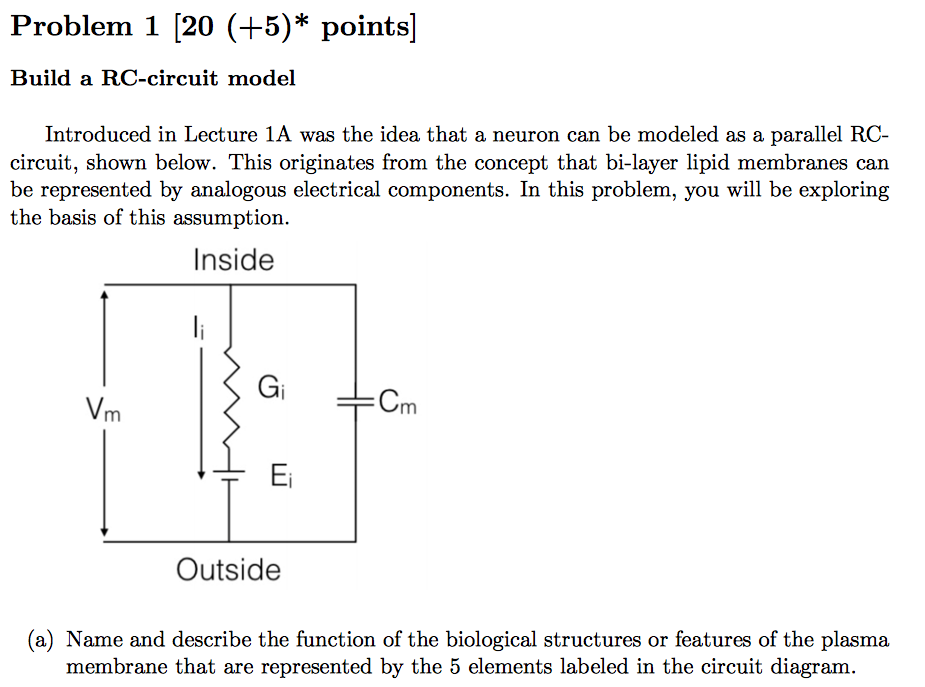
**Name**: Hui Shi **Hopkins ID**: B5F2C6



***Ans:***

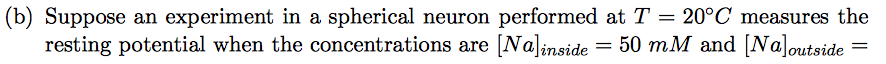
represents the membrane potential and is the difference between the inner membrane potential and the outer membrane potential

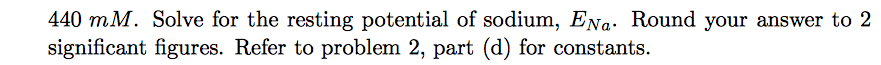
represents the channel conductance for ionic specie i or the ease of ion to flow through the channel

EI is the electrical potential that drives concentration gradient, specific for ionic specie i

Cm is the membrane capacitance or the ability for a membrane to separate charge.

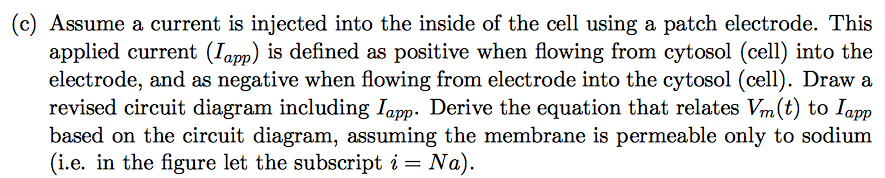
Ii  is the current existed because of the charged ion move into or out of the membrane.



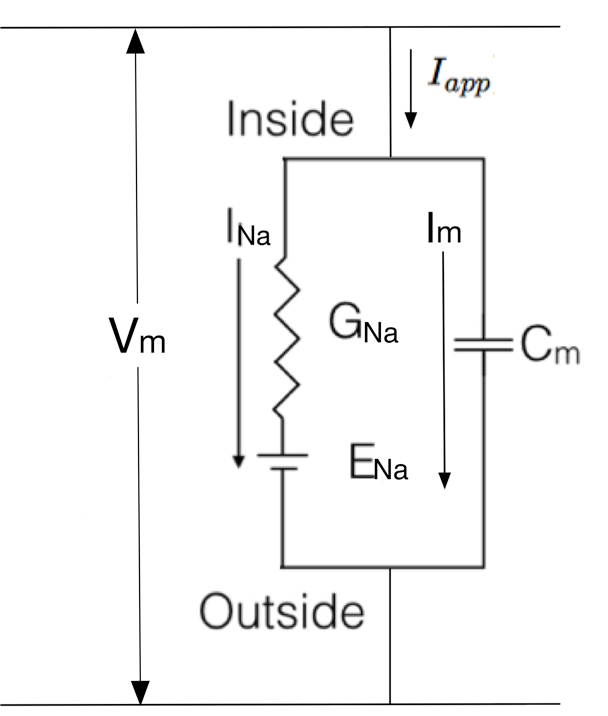


***Ans:***

Apply the Nernst equation, we learn that the equilibrium potential is



***Ans:***



This question requires us to apply Kirchhoff’s current law and Ohm’s law to solve for the dynamic equation of Vm(t) as a result of Iapp(t):

Ohm’s Law: Vm=IR

Capacitor:

KCL:

Define

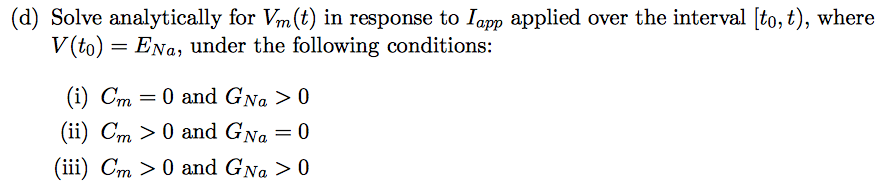
Apply KCL:

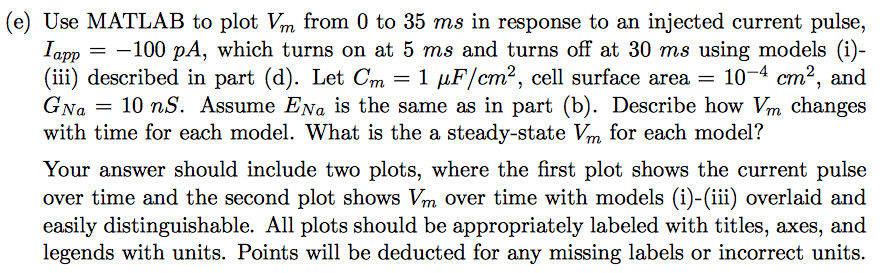
where

Therefore,

Taking integral on both side:

𝑚𝐺𝑁𝑎𝑁𝑎−𝑉𝑚+𝐼𝑎𝑝𝑝𝛿𝑉𝑚=𝛿𝑡





(f) Describe at least one response from a real neuron that cannot be accounted for by the above models. How would you change the model in order to capture this behavior?

