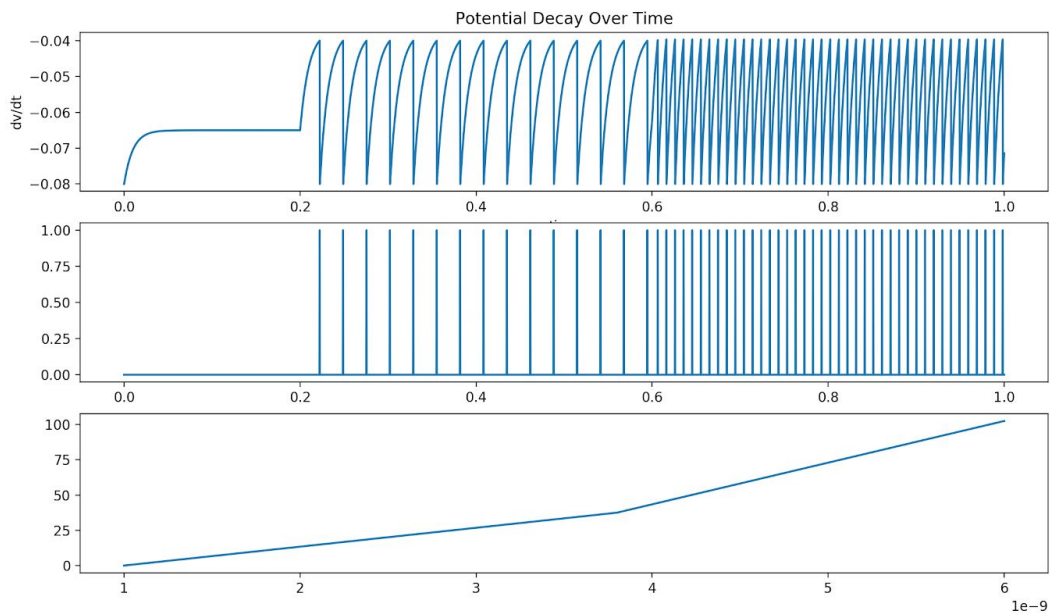


## II. Questions

- 1.) A IF neuron will eventually reach the Action potential and spike and reset to 0, and LIF neuron may not reach AP because the input current may be too low.
- 2.) Assuming input current is high enough, both LIF and IF neuron will reach AP and IF will reach AP before LIF neuron
- 3.) LIF neuron does not simulate the chemical components and may never reach AP if the input current is too low or if resistance is too high

## III.

1 and 2)



The First Graph is the potential decay over time, the second is the spiking behavior the third graph is the firing rate. Constants are listed below  $I_1$ ,  $I_2$ ,  $I_3$  is a peicewise current function that we fed in to show spiking behavior

$\tau = 10e-3$   
 $V_{reset} = -0.080$   
 $V_{rest} = -0.075$   
 $V_{th} = -0.040$   
 $R_M = 10e6$   
 $dt = 0.0002$   
 $I_1 = 1e-9$   
 $I_2 = 3.8e-9$   
 $I_3 = 6e-9$

$T = 1$

3)

As we increase current we get more spikes/s therefore firing rate increases until a threshold (neuron can't fire anymore)

4)

Constants (mv)

$a = 0.02$

$b = 0.2$

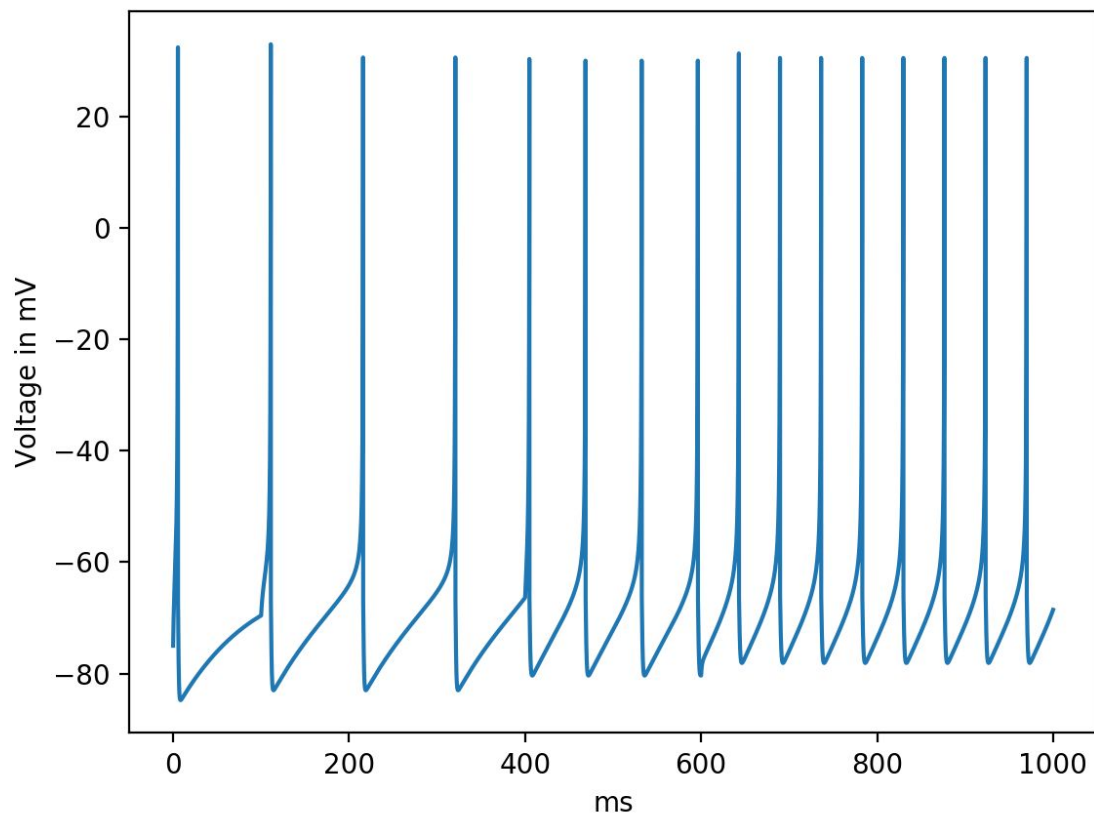
$c = -65$

$d = 8$

$V_{\text{rest}} = -75$

$V_{\text{th}} = 30$

$T = 1000$



5)

**Constants Used**

$V_{rest} = 0$

$C_m = 1$

$V_{na} = 115$

$V_k = -12$

$V_l = 10.613$

$g_{na} = 120$

$g_k = 36$

$g_l = .3$

