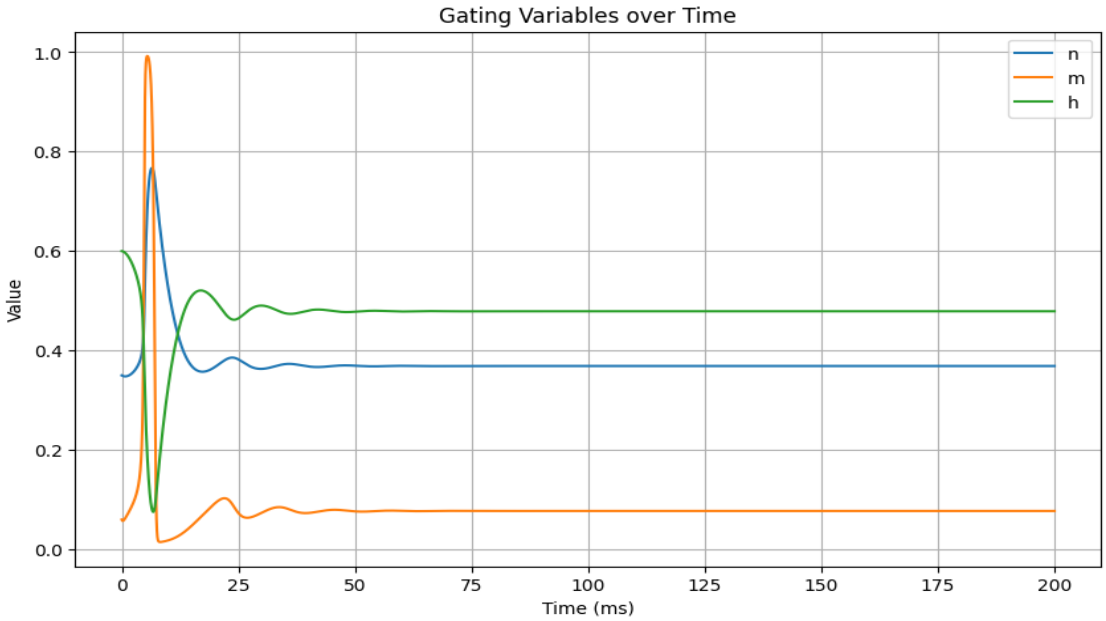
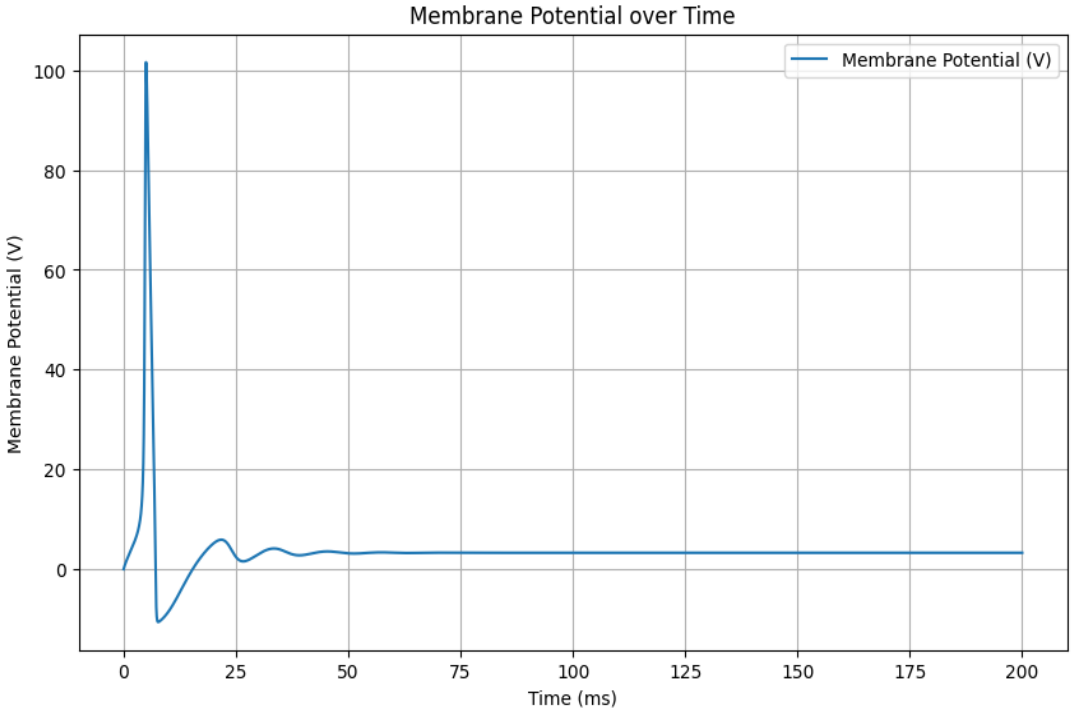
Part 1

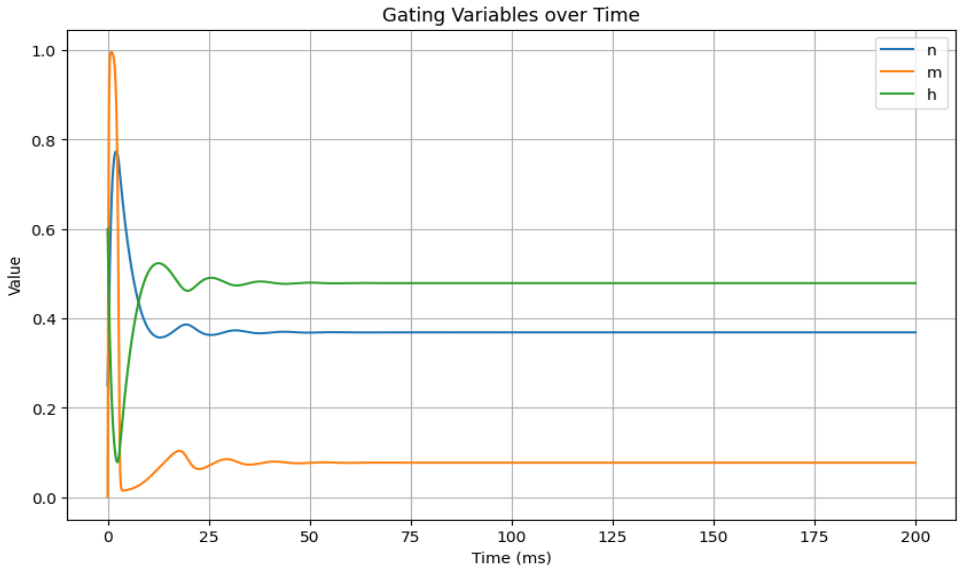
Problem 1:

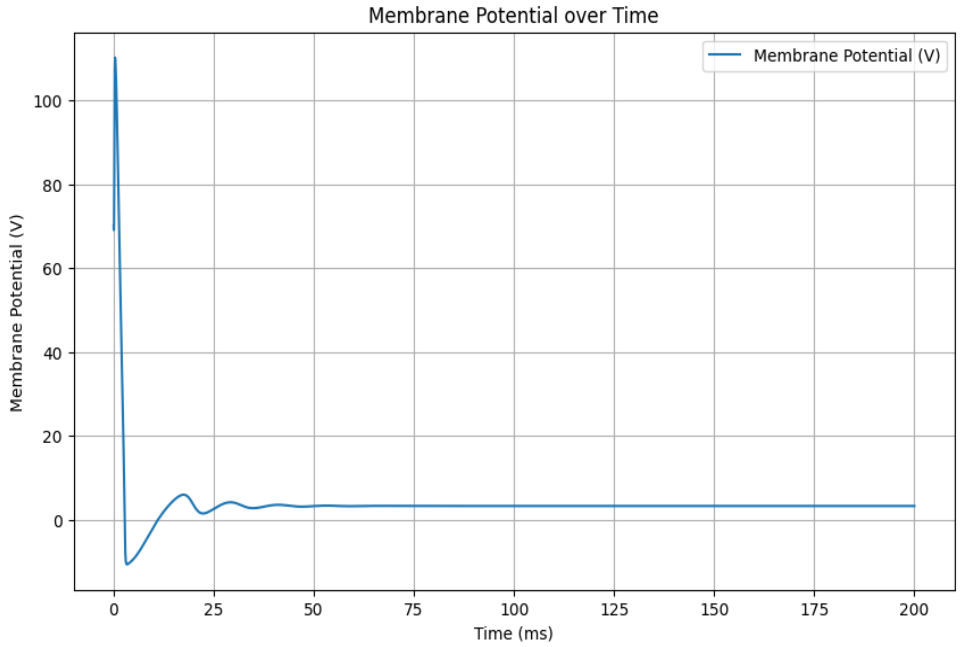




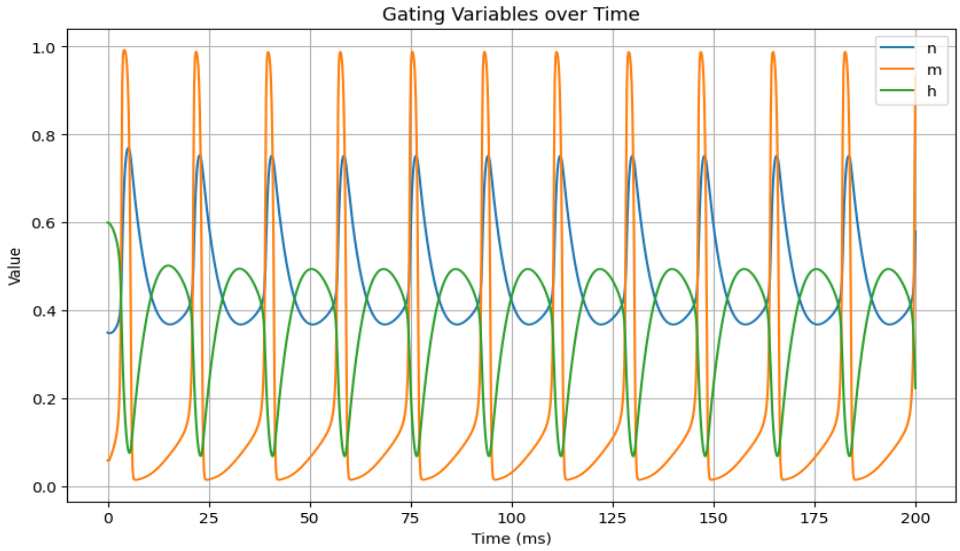
- As membrane potential **V** rises, both **m** and **n** increase.
- At extreme membrane potentials, **m** and **n** tend towards 1, indicating a high probability of channel opening.
- At more positive membrane potentials,**h** decreases, indicating a decreasing probability of the sodium channels being inactivated.
- When **h** is high, the sodium channels are inactivated, meaning they cannot be opened again until **h** decreases
- Also **m** and **h** are usually faster than **n**
- After repolarization it goes to refractory period

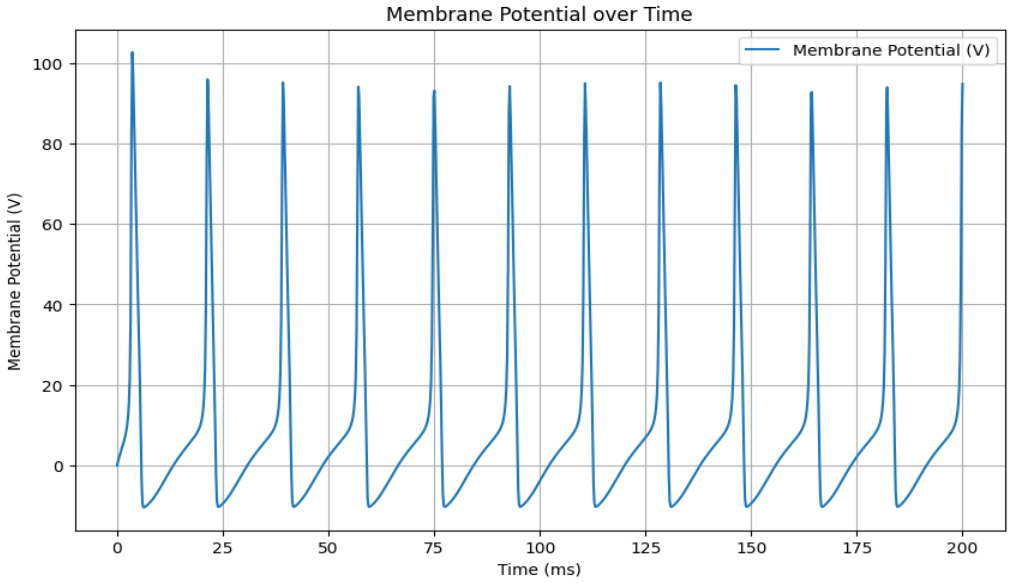
Problem 2:


Gating Variables over Time
n
m
h
Value
Time (ms)
0.0
0.2
0.4
0.6
0.8
1.0
0
25
50
75
100
125
150
175
200

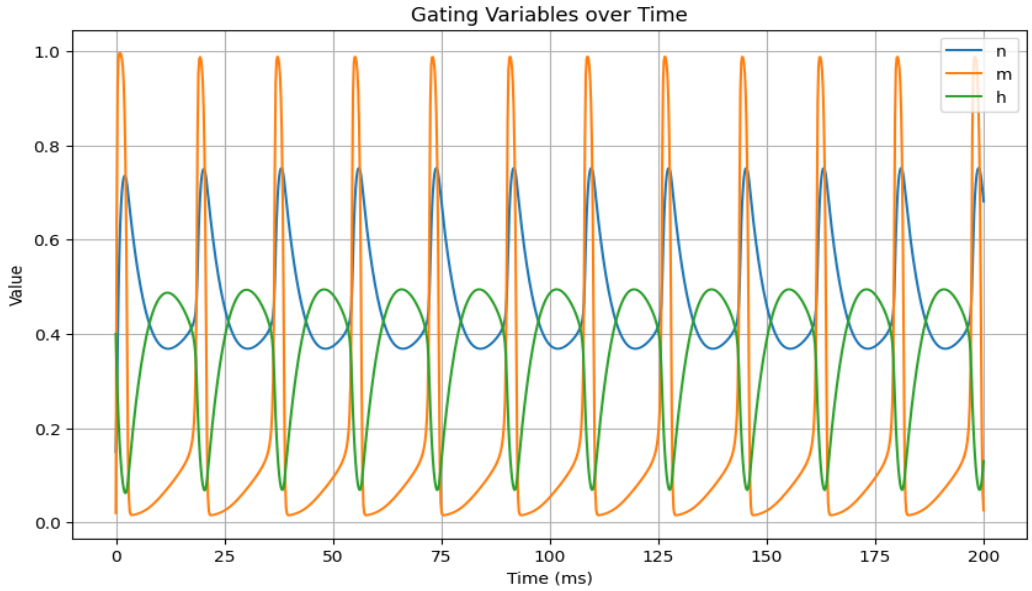

Membrane Potential over Time
Membrane Potential (V)
Membrane Potential (V)
Time (ms)
0
20
40
60
80
100
0
25
50
75
100
125
150
175
200

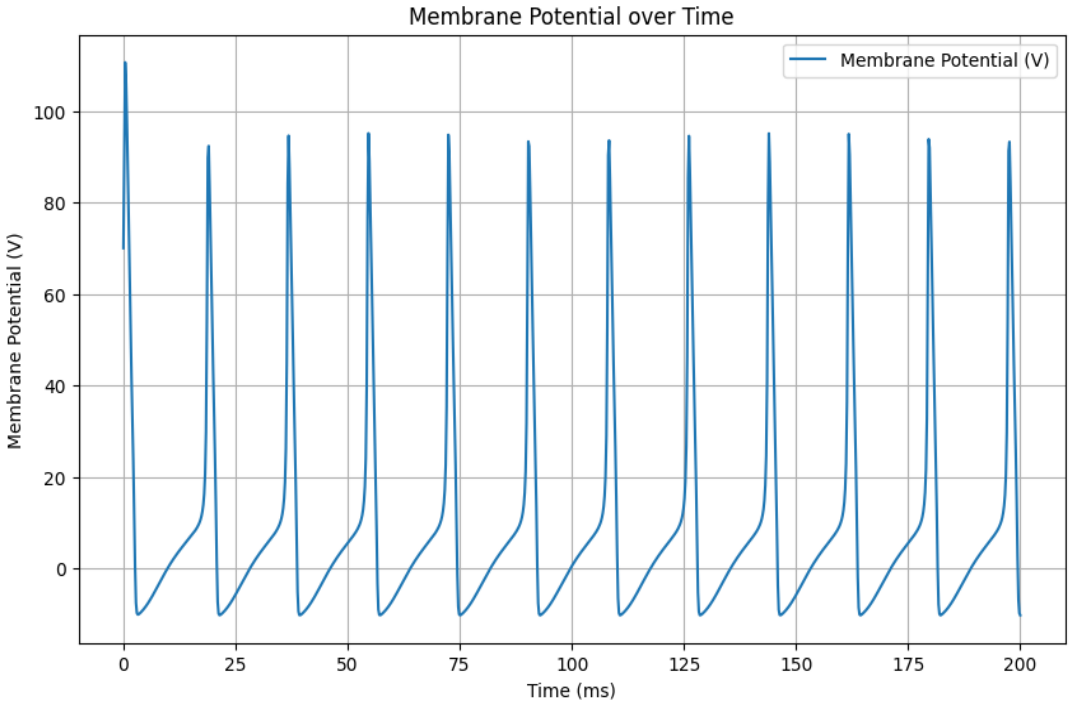
Problem 3:


Gating Variables over Time
n
m
h
Value
Time (ms)
0.0
0.2
0.4
0.6
0.8
1.0
0
25
50
75
100
125
150
175
200


Membrane Potential over Time
Membrane Potential (V)
Membrane Potential (V)
Time (ms)
0
20
40
60
80
100
0
25
50
75
100
125
150
175
200

Problem 4





Part 2

Problem 1:

- $\varepsilon_1 >> \varepsilon_2$
- $\varepsilon_1 >> \varepsilon_2$
- $\varepsilon_1 \approx \varepsilon_2$

Problem 2:

- $\varepsilon_1 << \varepsilon_2$
- $\varepsilon_1 \approx \varepsilon_2$
- $\varepsilon_1 >> \varepsilon_2$