

# EE 206: Homework #7

Schmitt Triggers, Capacitors, and Inductors. Due Monday, October 19th

Please make the subject "EE 206 HW#7" if submitting homework electronically to lauren.n.singelmann@ndsu.edu (or on blackboard)

## Comparitors

1) Assume a thermistor has the temperature - resistance relationship of

$$R = 1000 \exp\left(\frac{3905}{T+273} - \frac{205}{298}\right) \Omega$$

Design a circuit which outputs

- 0V when  $T < 0C$
- 5V when  $T > 0C$

## Schmitt Triggers

2) Using the same thermistor, design a circuit which outputs

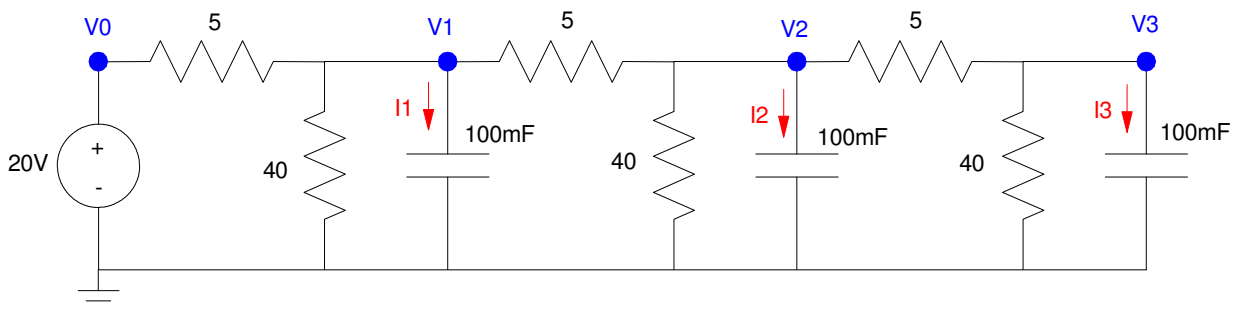
- 0V when  $T < 0C$
- 5V when  $T > 5C$

## Capacitors:

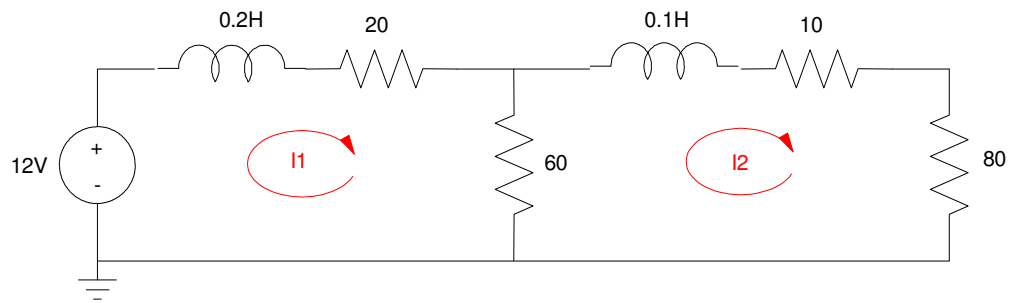
3) Write the differential equations which describe the following RC circuit

4) Assume  $V1(0) = V2(0) = V3(0)$ . Determine the voltages for  $0 < t < 10$  seconds using numerical integration and Matlab

5) Simulate this circuit in CircuitLab to verify your answer for problem #4



## Inductors



Problem 6, 7, & 8

- 6) Write the differential equations which describe the above RL circuit
- 7) Assume  $I_1(0) = I_2(0)$ . Determine the currents for  $0 < t < 10\text{ms}$  using numerical integration and Matlab
- 8) Simulate this circuit in CircuitLab to verify your answer for problem #7