ECE 320 - Homework #7

DC to AC, SCR. Due Monday, February 28th

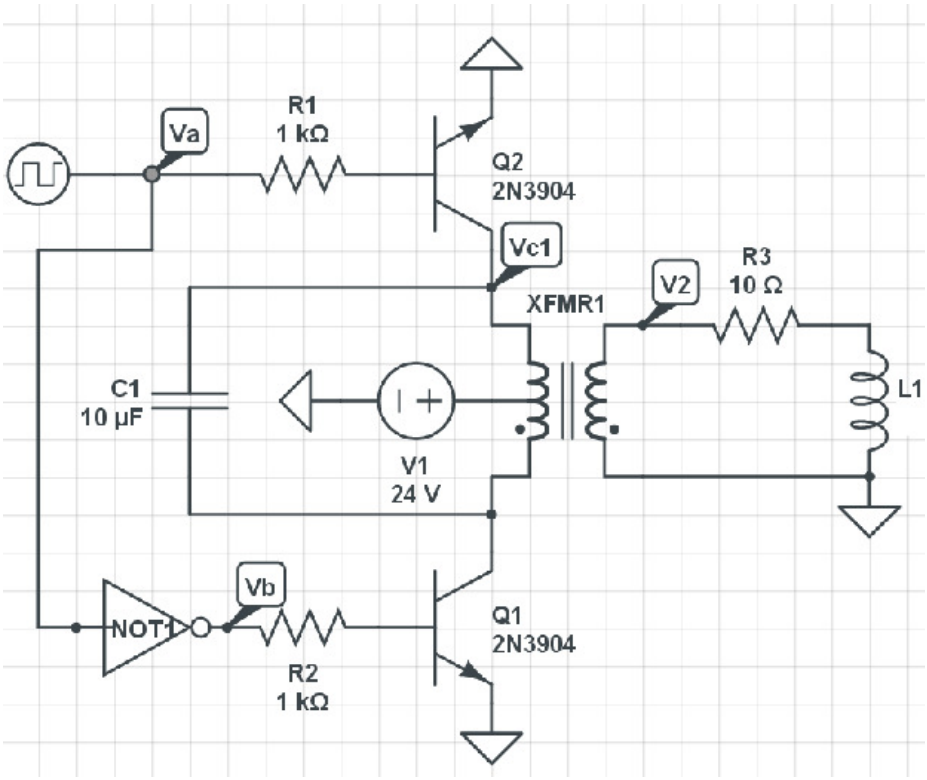
DC to AC

1) Let L1 = 200mH

- Va = 0V / 5V square wave, 60Hz, 0 degree time delay
- Vb = 0V / 5V square wave, 60Hz, 180 degree time delay
- C1 = 10uF

Determine using CircuitLab the voltage V2 (i.e. the votlage across a DC motor, modeled as a 10 Ohm & 100mH load)

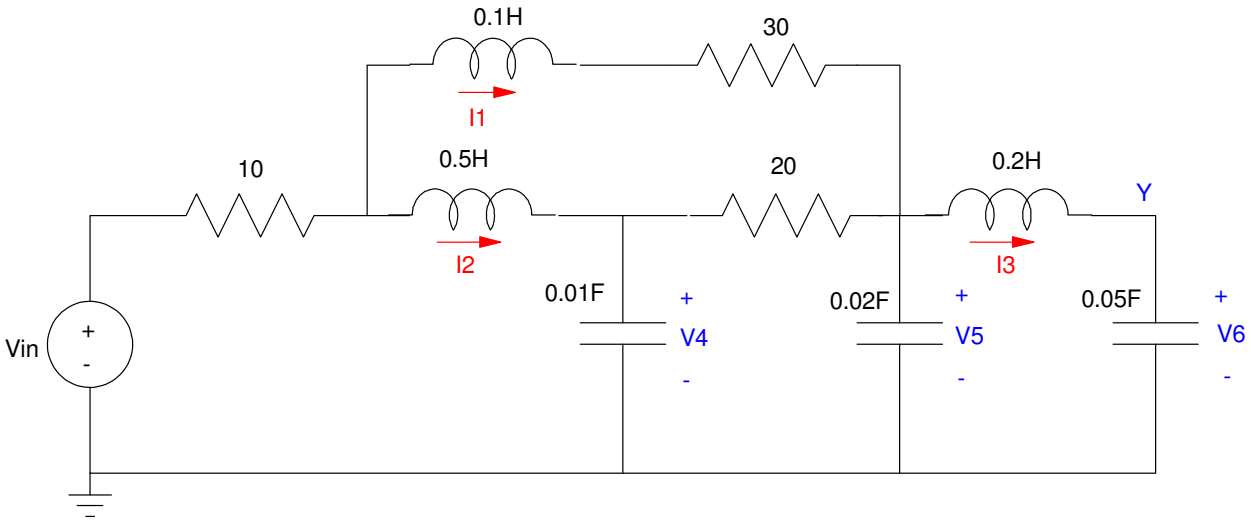
2) Adjust C1 so that the voltage across the motor is as close to a sine wave as possible (trial and error)



DC to AC Converter (problem 1 & 2)

Circuits and Differential Equations

3) Write the differential equations that describe the following circuit



SCR

4) Assume a firing angle of 45 degrees. Determine the voltage at V1 and V2 (both DC and AC).

5) Change this circuit so that

- The voltge at V2 is 9.00V (DC)
- With a ripple of 1.00Vpp

6) Simulate this circuit in Matlab by

- Writing the differential eqautions which describe this circuit (state variables: IL and Vc)
- Specify V1(t) as a full-wave rectified sine wave going from θ to $\pi + \theta$
- Use numerical integration to find V2(t)