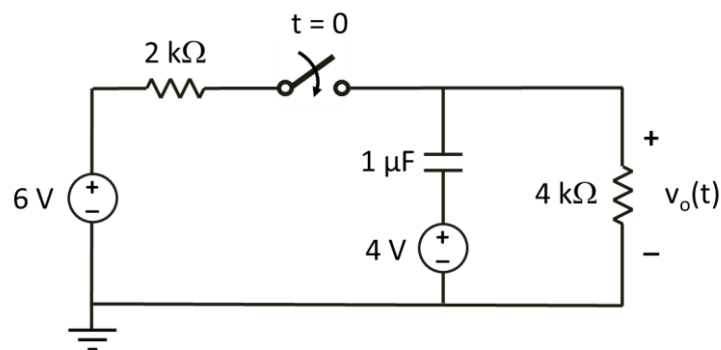# HOMEWORK 5

Issued on Nov. 21, 2021 (Sunday)
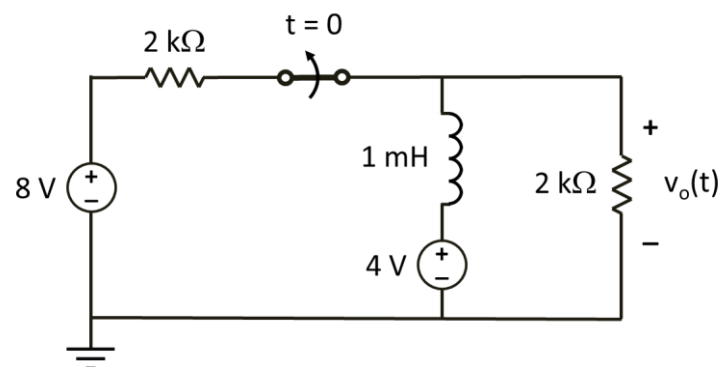Due date: Nov. 30, 2020 (Tuesday), 11:59pm
[Please submit your homework online https://canvas.ust.hk]
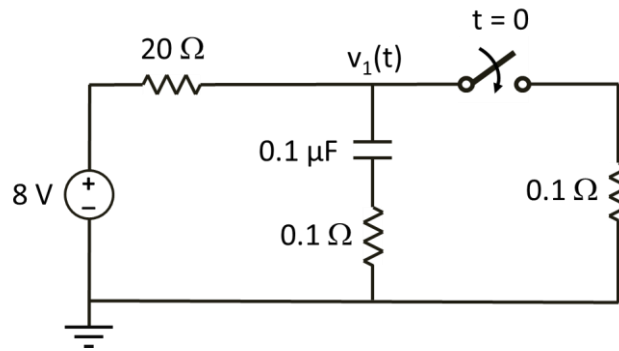
Q1. Assume the switch has been open for a long time. The switch is closed at t = 0. Find the equation of the voltage $v_o(t)$ for t > 0.


Q2. Assume the switch has been closed for a long time. The switch is opened at t = 0. Find the equation of the voltage $v_o(t)$ for t > 0.

Q3. Assume the switch has been open for a long time. The switch is closed at t = 0.
(a) Find the equation of the voltage $v_1(t)$ for t > 0.
(b) Plot $v_1(t)$ as a function of time starting from t < 0.


Q4. Assume the switch has been open for a long time. The switch is closed at t = 0.
(a) Find the equation of the current $i_1(t)$ for t > 0.
(b) Plot $i_1(t)$ as a function of time starting from t < 0.
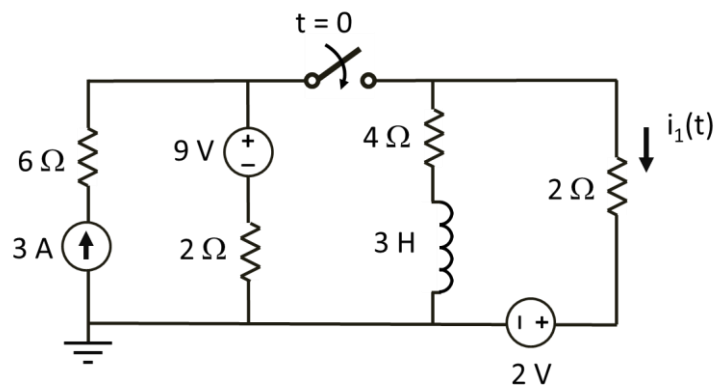
Q5. Find V_o and I_o in the circuit below with
(i) ideal diode model,
(ii) offset diode model ($V_F = 0.5$ V).
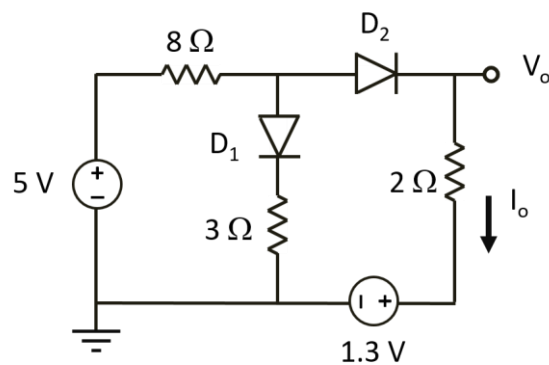
Q6. Plot V_o as a function of V_{IN} for V_{IN} from -5 V to 25 V in the circuit with
(i) ideal diode model,
(ii) offset diode model ($V_F = 0.5$ V).
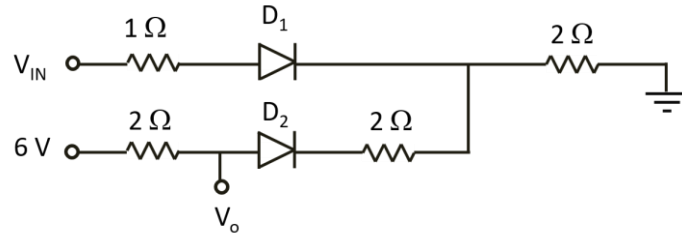
Q7. In the figure, it shows a Zener diode voltage regulator circuit ($V_{Z0} = 5.6$ V, $R_Z = 10\ \Omega$).
(a) Determine the output voltage V_o if $V_{IN} = 6.5$ V.
(b) Plot V_o as the function of V_{IN} for 6 V $< V_{IN} <$ 8 V.
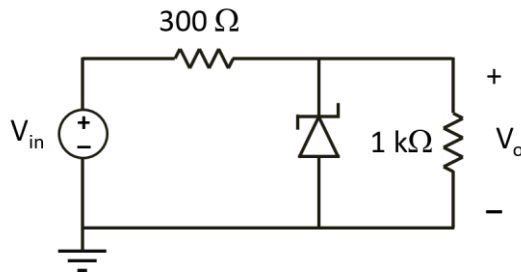
Q8. Find V_o assuming ideal op amp and offset diode model ($V_F = 0.5$ V) for the case:
(i) when $V_{in} = 4$ V,
(ii) when $V_{in} = -4$ V.