

ELEC2070 Assignment 1 Questions
(Solve at home and submit to iLearn by the due date)



Total 60 marks. PLEASE USE NEAT HANDWRITING. Assignments with poor handwriting will not be marked.

1. For the circuit in Fig. 1:

- Label all the node voltages and show and label all branch currents for mesh analysis if they are not already labelled. (2 marks)
- Calculate the node voltages and all branch currents. Show your equations and solutions in a logical order. (6 marks)
- Calculate the power generated or absorbed by each element including the sources. Show that power is conserved in the circuit. (4 marks)

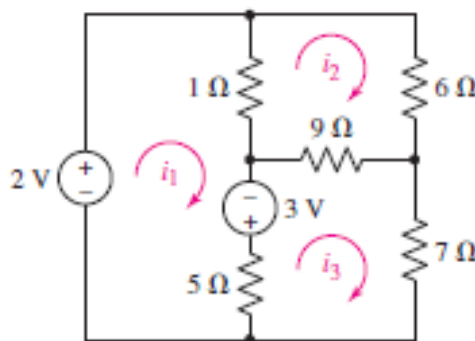


Fig. 1

2. Consider the circuit in Fig. 2.

- Write and solve mesh equations (6 marks).
- Determine the Thévenin equivalent of the circuit shown in Fig. 2 as seen looking into the two open terminals (4 marks).

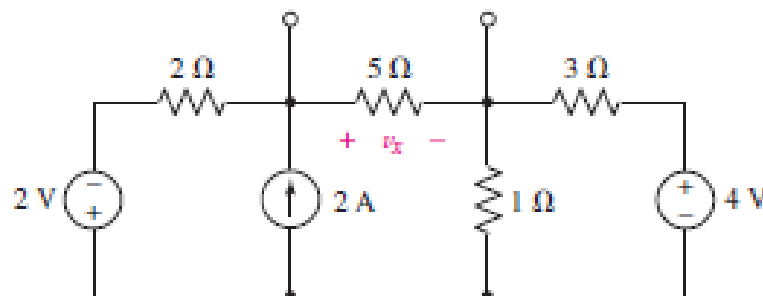


Fig. 2

- Referring to Fig. 3. (a) (5 marks) Determine the power absorbed by the $3.3\ \Omega$ resistor, (b) (5 marks) replace the $3.3\ \Omega$ resistor with another resistor such that it absorbs maximum power from the rest of the circuit.

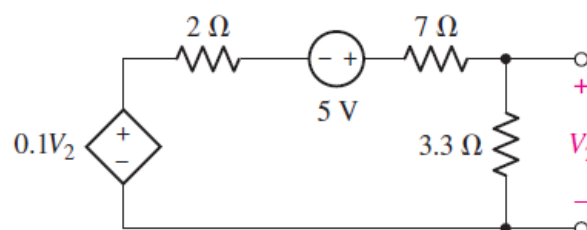


Fig. 3

4. For the op amp circuit shown in Fig. 4 calculate v_{out} if (a) (2 marks) $R_1 = R_2 = 100\ \Omega$ and $v_{in} = 5\text{ V}$ and (b) (2 marks) $R_2 = 200R_1$ and $v_{in} = 1\text{ V}$ and (c) (2 marks) $R_1 = 4.7\text{ k}\Omega$, $R_2 = 47\text{ k}\Omega$ and $v_{in} = 20\sin 5t\text{ V}$

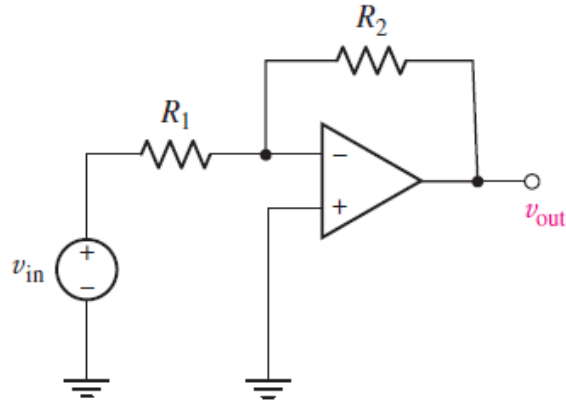


Fig. 4

5. (10 marks) The circuit shown in Fig. 5 is at steady state when the switch opens at time $t=0$. Determine $v_1(0^-)$, $v_1(0^+)$, $i_2(0^-)$, $i_2(0^+)$, $i_3(0^-)$, $i_3(0^+)$, $v_4(0^-)$, and $v_4(0^+)$.

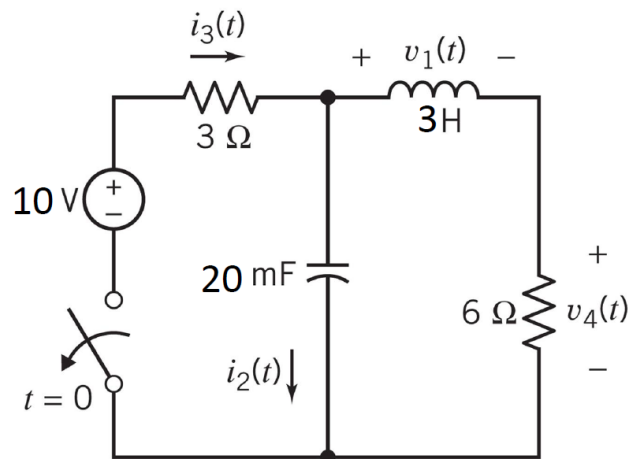


Fig. 5

6. (12 marks) The circuit shown in Fig. 6 is at steady state when the switch closes at time $t=0$. Determine $v_1(0^-)$, $v_1(0^+)$, $i_2(0^-)$, and $i_2(0^+)$.

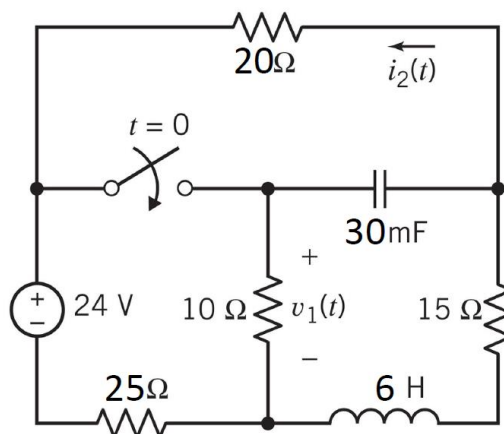


Fig. 6