

# VE215 2023Su Assignment 1

**Due Date: 23:59, May.25th, 2023**

In order to get full marks, you shall write all the intermediate steps of calculation or proof unless otherwise indicated.

**Exercise 1.1** (30%) The voltage  $v$  (unit:V) across a device and the current  $i$  (unit:A) through it are

$$v(t) = 10 \cos \frac{\pi t}{2} + 10 \quad i(t) = \begin{cases} 0 & t < 0 \\ -10t^2 + 20t & 0 \leq t < 1 \\ 10e^{-t+1} & 1 \leq t < \ln 2 + 1 \\ 5 & t \geq \ln 2 + 1 \end{cases}$$

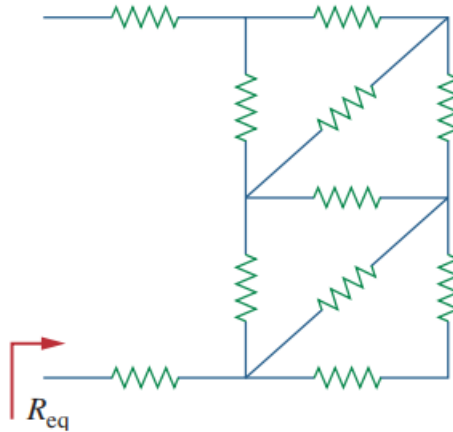
- (a) (10%) Calculate the total charge in the device at  $t = 1.5s$ .
- (b) (10%) Calculate the power delivered to the element at  $t = 1.5s$ .
- (c) (10%) Calculate the energy delivered to the device between 3 and 5 s.

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## Exercise 1.2 (30%)

In the circuit below, all the resistors have a resistance of  $3R$ . Answer the following questions for this circuit.

- (a) (15%) Determine the number of branches, nodes, loops and meshes. Write your answers directly.
- (b) (15%) Calculate the equivalent resistance.

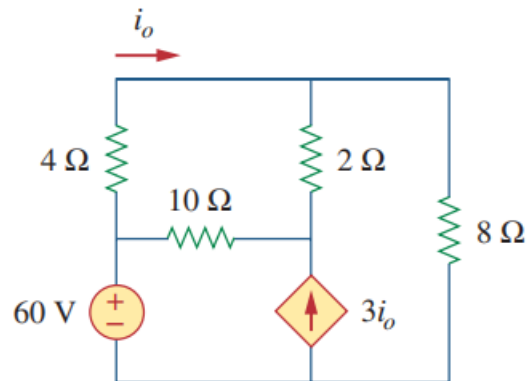


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## Exercise 1.3 (40%)

Solve the following questions with given methods.

(a) (20%) Using nodal analysis, find current  $i_o$  in the following circuit.



(b) (20%) Using nodal analysis, find current  $I_o$  in the following circuit.

