ECS 203 2015: Exercise 2 Solution

Instructions

i. Separate into groups of no more than four persons. Make sure the group members are not exactly the same as any of your earlier group.

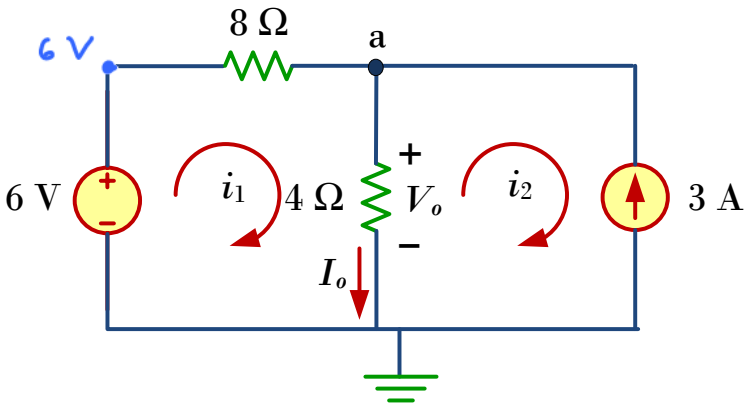
ii. Only one submission is needed for each group. Late submission will not be accepted.

iii. ***Write down all the steps*** that you have done to obtain your answers. You may not get full credit even when your answer is correct without showing how you get your answer.

iv. **Do not panic.**

Name	ID
Prapun	555

Consider the circuit below.



The same circuit is used in Example 4.2.1 of the lecture note.

a. **Use nodal analysis** to find the node voltage V_a

KCL@ node a: $\frac{V_a-6}{8}+\frac{V_a}{4}-3=0$

$V_a-6+2V_a-24=0$

$3V_a=30$

$V_a=10$ V

b. **Use mesh analysis** to find the mesh currents i_1 and i_2.

KVL around mesh 1: $6-8i_1-4(i_1-i_2)=0$

$6-12i_1+4i_2=0$ (★)

For mesh 2, don't have to apply KVL because i_2 is the only mesh current that passes through the 3A current source. Therefore, $i_2=-3$A. ("−" because i_2 is in the opposite direction)

Combining with eqn. (★) above, we have $i_1=\frac{4i_2+6}{12}=\frac{-12+6}{12}=-0.5$A

c. Find V_0 $=V_a=10$V Alternatively, $V_0=(i_1-i_2)\times 4=(-0.5-(-3))\times 4=2.5\times 4=10$ V.

d. Find I_0 $=i_1-i_2=-0.5-(-3)=2.5$A

Alternatively, by Ohm's law, $I_0=\frac{V_0}{4}=\frac{10}{4}=2.5$A