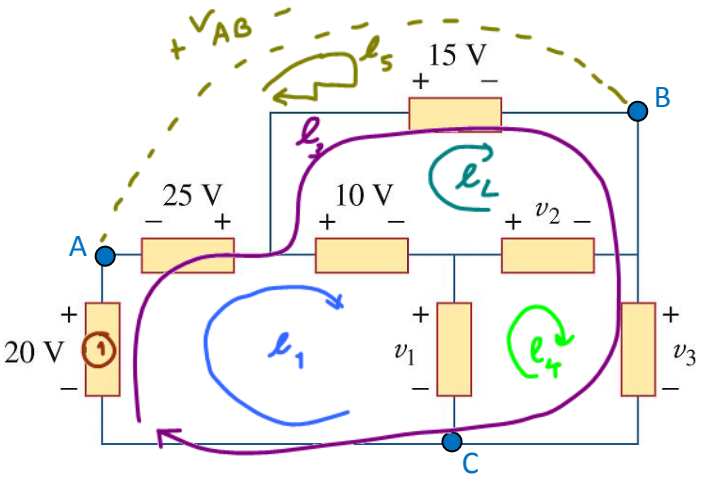
ECS 203 2015: Exercise 1 Solution

Instructions

i. Separate into groups of no more than four persons.
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.



minor algebraic mistake: -0.1 each

1. Use KVL to obtain v_1, v_2, and v_3.
For each application of the KVL, make sure that you indicate (draw) the corresponding loop and write down the corresponding equation.

KVL around ℓ_1: $20 + 25 - 10 - v_1 = 0 \Rightarrow v_1 = 35$ V

KVL around ℓ_L: $-15 + v_2 + 10 = 0 \Rightarrow v_2 = 5$ V

KVL around ℓ_3: $20 + 25 - 15 - v_3 = 0 \Rightarrow v_3 = 30$ V ← Here, although loop 4 is easier because it involves less elements, we choose to use loop 3 because it does not involve v1 and v2. So, in the case that we found v1 and/or v2 incorrectly in the earlier part of the problem, the error won't affect our calculation of v3 here.

Check:

KVL around ℓ_4: $v_1 - v_2 - v_3 = 0$ ✓

We use loop 4 to double-check our answer here.

2. Find V_{AB} and V_{AC}.

KCL around ℓ_5:

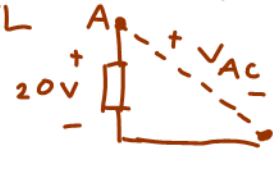
$-V_{AB} + 15 - 25 = 0$

$V_{AB} = -10$ V

There are two ways to find V_{AC}.

(i) V_{AC} is the voltage across element (1) because node A is the "+" terminal of the "20 V" and node C is the "−" terminal of the "20 V" across element (1).

(ii) KVL



$20 - V_{AC} = 0$

$V_{AC} = 20$ V.

Both technique give $V_{AC} = 20$ V.