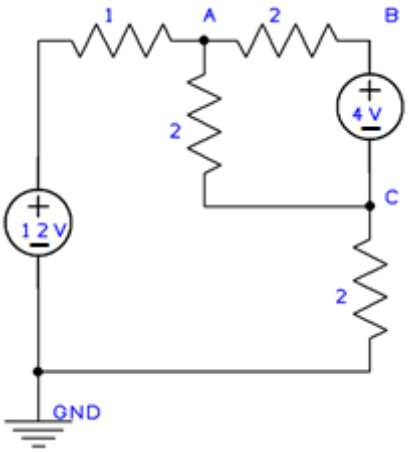
ELEC1100: KCL & KVL Exercises

Note:

- **This is an additional exercises document for your own practice. Solution will be released on Mar 27 (Fri).**
- **THIS IS NOT YOUR LAB HOMEWORK.**
- **Lab homework starts on March 30 (Mon), go to your Canvas lab page (LA1/LA2/LA3) to download Homework Questions.**

Exercise 1

Use **KVL** to find the voltages at node A and node B in Figure 1.



Exercise 2

Use **KCL** to find the voltages at node D and node E in Figure 2.

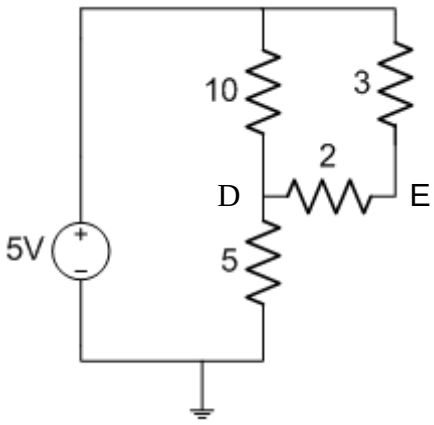


Figure 2

Exercise 3

Figure 3 shows a Zener diode circuit where the breakdown voltage of the Zener diode is 5V. It is known that when $V_{in} \geq 7V$, the Zener diode can be regarded as a small resistor $R_z = 6\ \Omega$ connected in series with a 5V voltage source as shown in the right part of Figure 3. That resistance R_s is dependent on the load R with $R_s = 0.4R$.

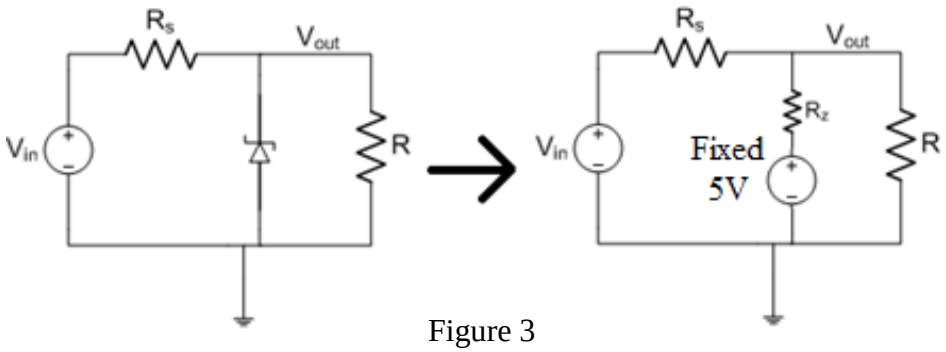


Figure 3

Show that when $V_{in} \geq 7V$, V_{out} is given by:

$$V_{out} = \frac{15V_{in} + 5R}{R + 21}$$

(Hint: You may consider using KCL)

Exercise 4

a) Use KCL to find the current I_1 in Fig. 4.1.
b) If the resistor network in Fig. 4.1 is to be replaced by a single equivalent resistor, as in Fig. 4.2, what is the resistance required?
c) Use KVL to find the current I_2 in Fig. 4.3.
d) Based on the result in c), and by following the same procedure as that for b), find the equivalent resistance between A and B in Fig. 4.3.

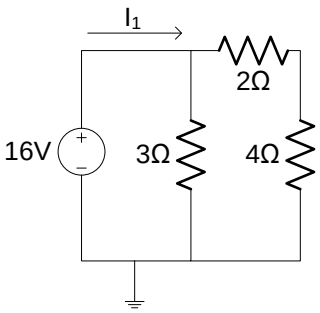


Fig. 4.1

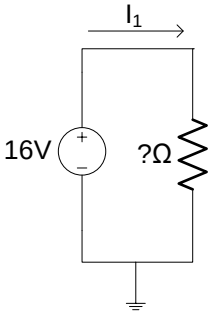


Fig. 4.2

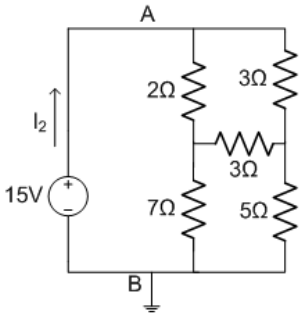


Fig. 4.3