Spring 2024 – ECE 3020
Homework 1

Due: 01/17/2024

1. Solve these questions from the text book

1.10 Current dividers play an important role in circuit design. Therefore it is important to develop a facility for dealing with current dividers in circuit analysis. Figure P1.10 shows a two-resistor current divider fed with an ideal current source I. Show that

$$I_1 = \frac{R_2}{R_1 + R_2} I$$

$$I_2 = \frac{R_1}{R_1 + R_2} I$$

and find the voltage V that develops across the current divider.

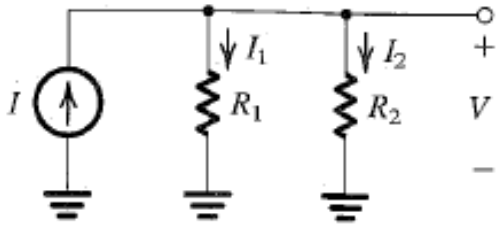

FIGURE P1.10

1.15 Through repeated application of Thévenin's theorem, find the Thévenin-equivalent of the circuit in Fig. P1.15 between node 4 and ground and hence find the current that flows through a load resistance of 1.5 kΩ connected between node 4 and ground.

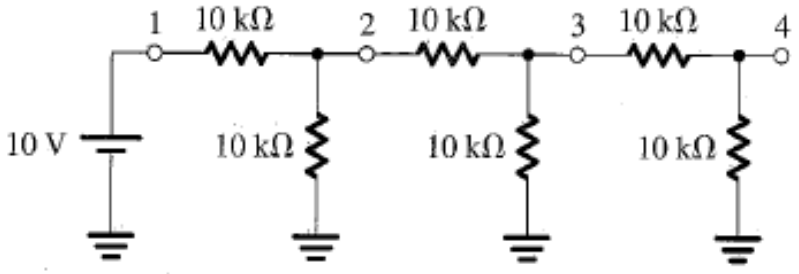

FIGURE P1.15

1.16 For the circuit shown in Fig. P1.16, find the current in all resistors and the voltage (with respect to ground) at their common node using two methods:

(a) Current: Define branch currents I_1 and I_2 in R_1 and R_2, respectively; identify two equations; and solve them.
(b) Voltage: Define the node voltage V at the common node; identify a single equation; and solve it.

Which method do you prefer? Why?

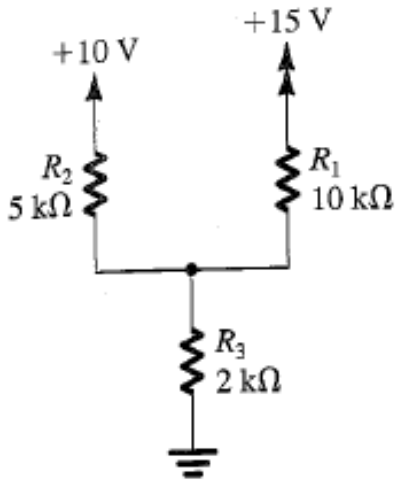

FIGURE P1.16

2. Write an expression for the current I_L in terms of I_S, R_S and R_L.