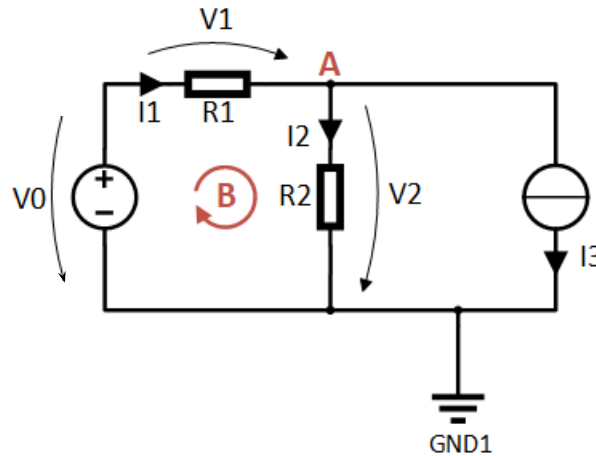


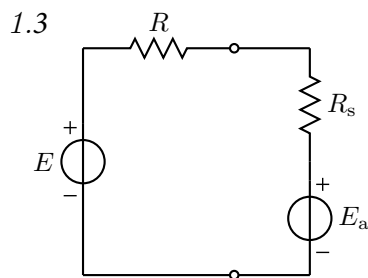
ELEC-C9610 Basics in Electronics

Calculation assignment 1. Deadline 14:00, September 21st, 2021

- 1.1 Explain what the Kirchhoff's laws define. Apply the laws to a node "A", loop "B" of the following circuit, and formulate two equations corresponding to the Kirchhoff's laws.



- 1.2 You have a box containing an unlimited number of 10 kΩ resistors. Show how to connect some of these together to construct equivalent resistances with the following values:
- 20 kΩ
 - 25 kΩ
 - 6.667 kΩ
 - 3.33 kΩ



A battery, with an open-circuit voltage E_a and internal resistance R_s , is charged by a voltage source E through resistance R as shown in the figure. By using Kirchhoff's laws, Ohm's law and the expression of power seen in the lecture, determine R so that the power flowing into the voltage source of the battery is P_{E_a} .

$$E_a = 12 \text{ V} \quad R_s = 0.1 \text{ } \Omega \quad E = 20 \text{ V}$$
$$P_{E_a} = 40 \text{ W.}$$