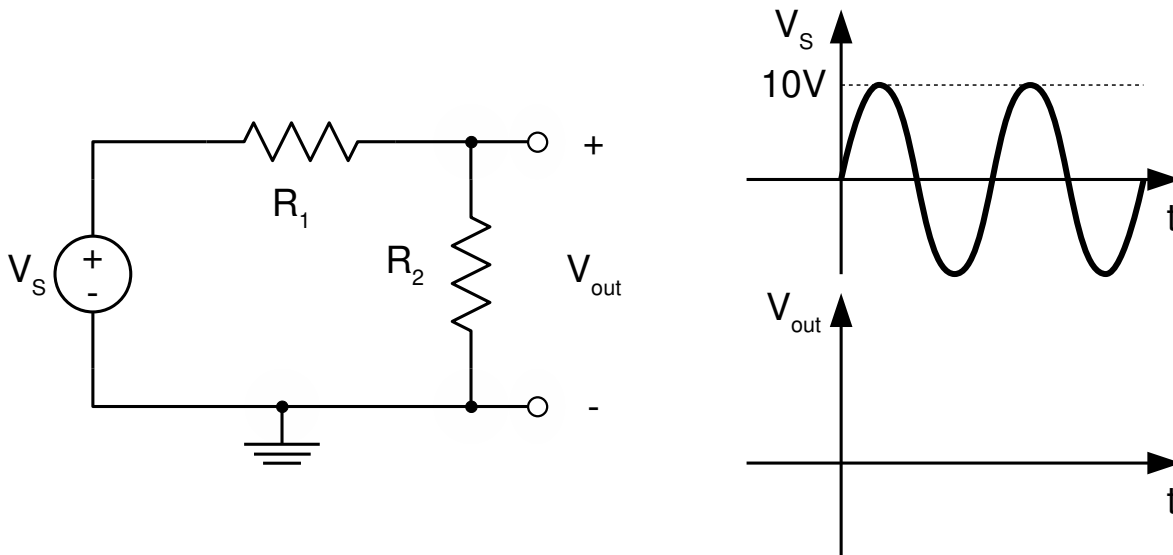


Assignment 1.5

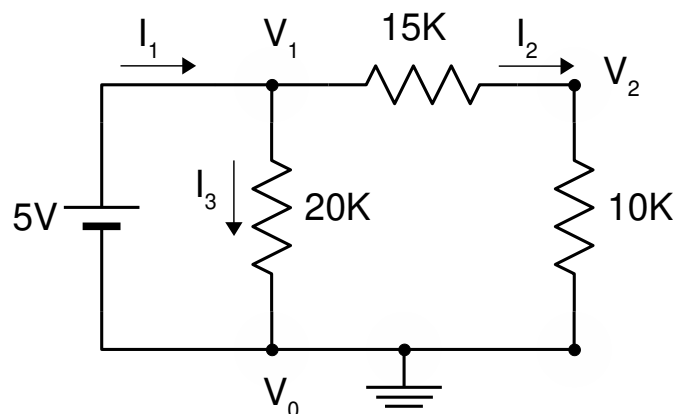
Exercise 1. Given the circuit in the figure, do:

- Calculate V_{out} as a function of V_s .
- Draw V_{out} corresponding to V_s in the chronogram for $R_1=10K$ and $R_2=20K$.
- Check the result using a circuit simulator¹.



Exercise 2. Given the circuit in the figure, do:

- Solve the circuit in DC: calculate V_0 , V_1 , V_2 , I_1 and I_2 .
- Calculate the power dissipated by the 15K resistor.
- Check the result using a circuit simulator.



Exercise 3. We want to use a LED as an indicator of the output value of a digital circuit. The logic levels of the digital circuit are 0V and 5V.

- Calculate the value of the current-limiting resistor to connect in series with the LED in order to get a current through the LED of 20mA. Consider that the forward voltage drop of the LED when it is conducting is approximately 1.7V.
- Resistors are not fabricated in all possible values. Search for the list of standard resistors values and select the value that better approximates the resistance value calculated above.

Exercise 4. Using the simple alarm example in the unit² as reference:

¹ E.g.: Circuitjs. <https://www.falstad.com/circuit/circuitjs.html>

² <http://tinyurl.com/y5wq35eg>

- a) Try to design a similar circuit that has an additional sensor. The alarm should activate whenever on/off switch is on (closed) and any of the sensors is conducting. Draw a diagram of the circuit.
- b) Simulate the circuit with a circuit simulator to check its operation.