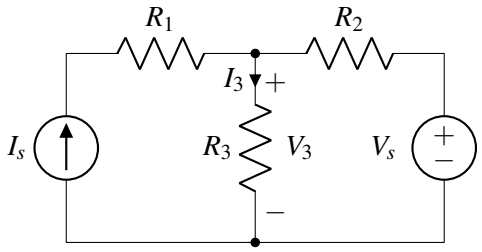
EECS 16A Designing Information Devices and Systems I
Spring 2023 Discussion 13A

1. Superposition

Consider the following circuit:



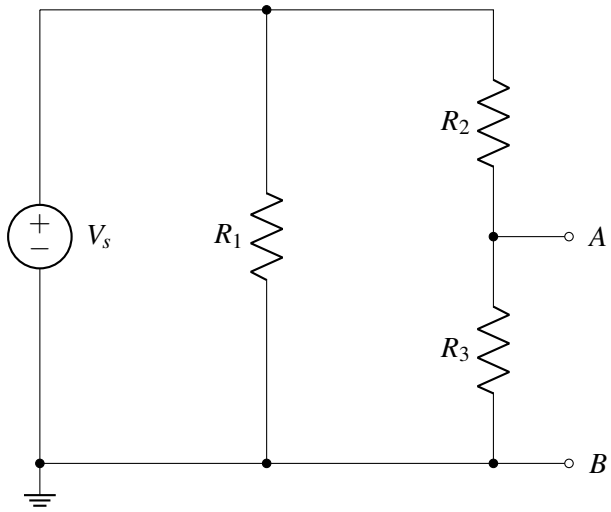
(a) With the current source turned on and the voltage source turned off, find the current I_3.

(b) With the voltage source turned on and the current source turned off, find the voltage drop V_3 across R_3.

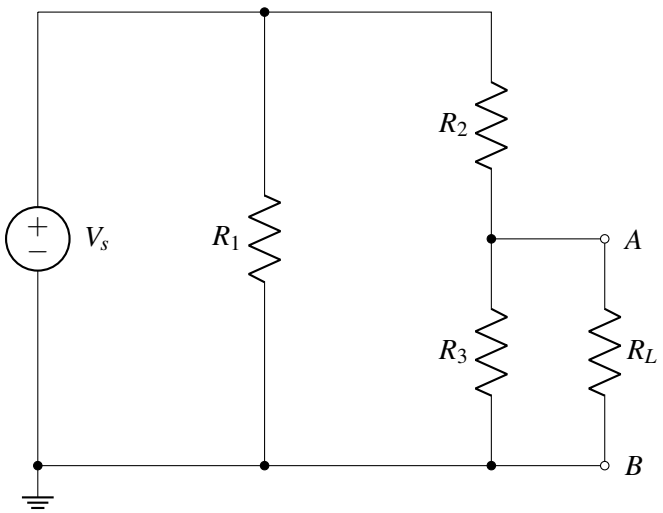
(c) Find the power dissipated by R_3.

2. Thévenin/Norton Equivalence

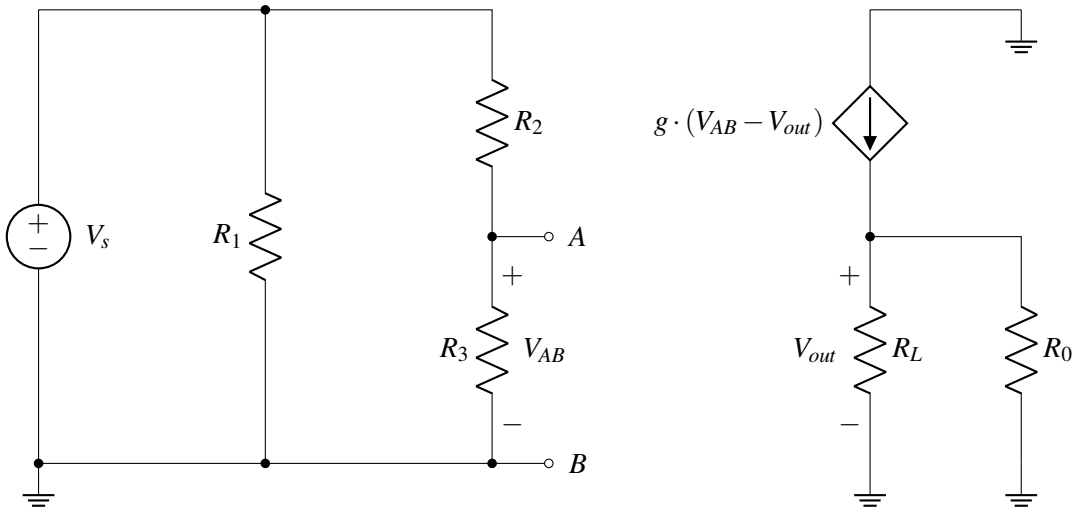
(a) Find the Thévenin resistance R_{th} of the circuit shown below, with respect to its terminals A and B.



(b) Now a load resistor, R_L, is connected across terminals A and B, as shown in the circuit below. Using Thévenin equivalence, find the power dissipated in the load resistor in terms of the given variables.



(c) We modify the circuit as shown below, where g is a known constant:

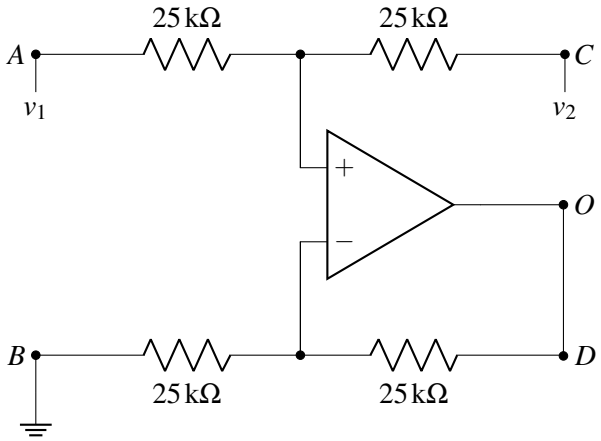


Find a symbolic expression for V_{out} as a function of V_s.
Hint: Redraw the left part of the circuit using its Thévenin equivalent.

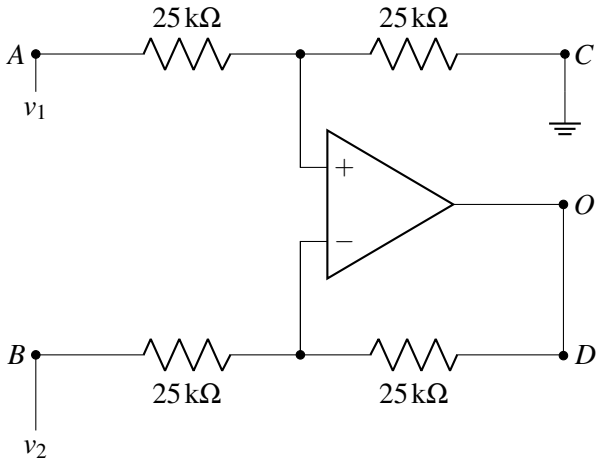
3. A Versatile Opamp Circuit

For each circuit configuration, determine the voltage at O, given that v_1 and v_2 are voltage sources. All circuit configurations are in negative feedback.

(a) Configuration 1:



(b) Configuration 2:



(c) Configuration 3: