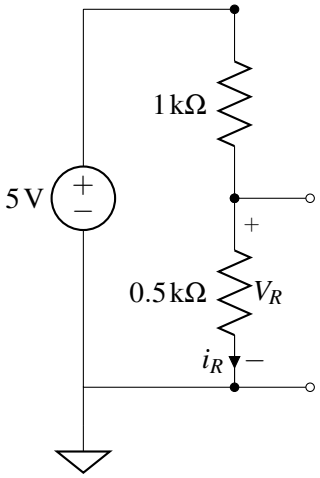
EECS 16A Designing Information Devices and Systems I
Fall 2016 Babak Ayazifar, Vladimir Stojanovic **Discussion 6A**

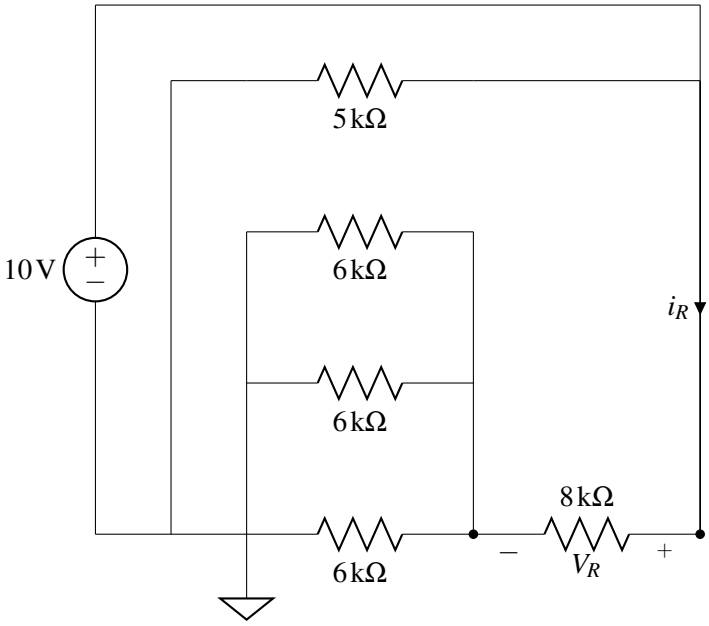
1. Circuits Drill

(a) Find the voltage V_R and current i_R in the following circuits.

i.

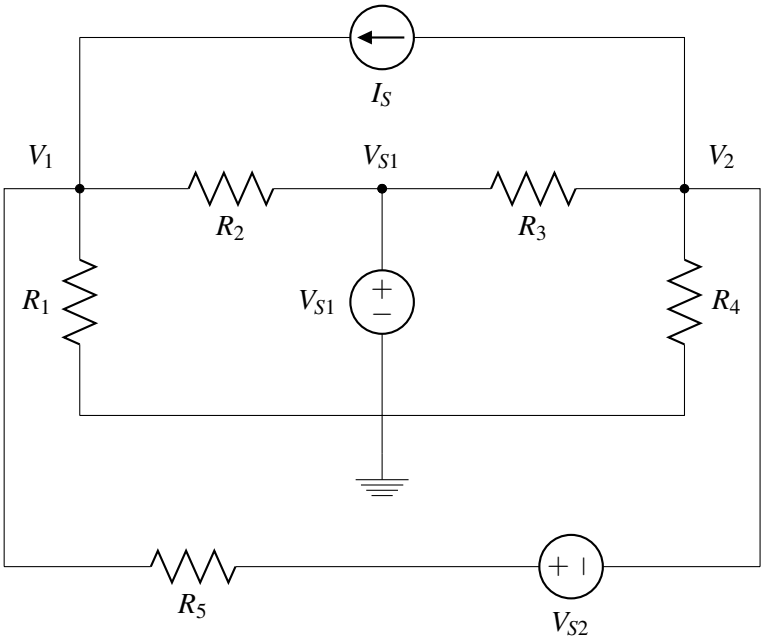


ii.

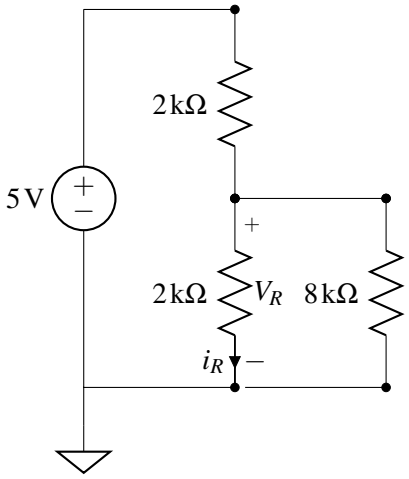


(b) Use nodal analysis to manually set up a system of equations whose solution would provide V_1 and V_2. You may leave your equations in terms of G_i, V_{S_i}, V_1, V_2 and I_S where V_1 and V_2 are the unknowns. Then formulate this as a matrix equation.

i.

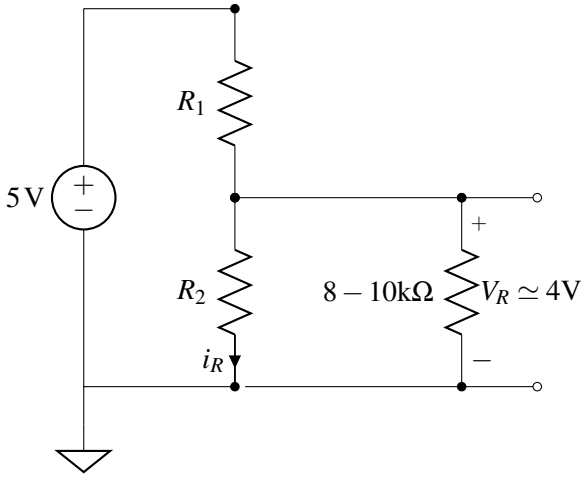


(c) What happens to the output voltage V_R (and the current i_R) if we attach a load of 8 kΩ to the output as depicted in the following circuit:



(d) What if the load is $\frac{8}{3}$kΩ? What if the load is 80 kΩ? For each situation, what is the current through each branch and the power dissipated by each circuit element?

(e) Say that we want to support loads in the range of 8kΩ to 10kΩ. We would like to maintain 4V across these load. How can we approximately achieve this by setting R_1 and R_2 in the following circuit?



(f) How much power will each resistor draw in this case? Is this efficient?