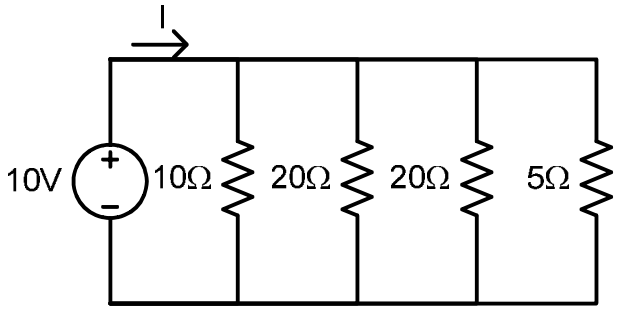
ECSE 200: Fundamentals of Electrical Engineering

Assignment 1

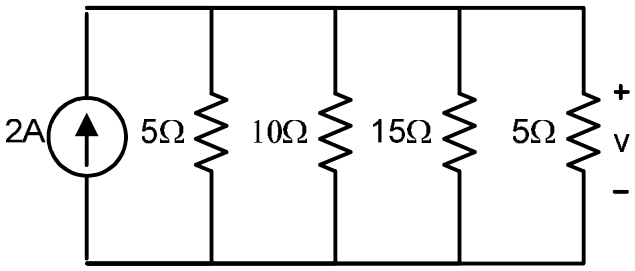
Winter 2006

Question 1

a) For the given circuit, calculate the value of the current I

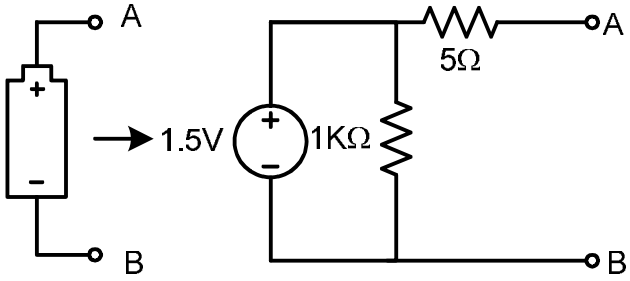


b) For the given circuit, calculate the value of the voltage v

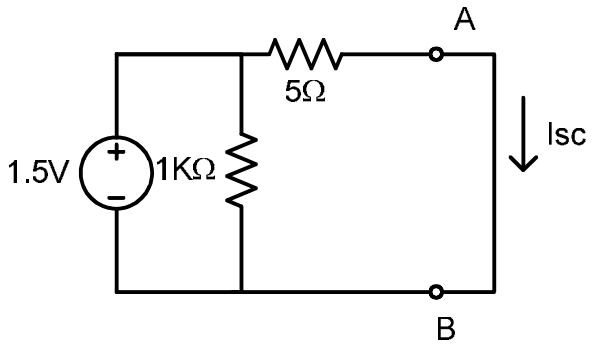


Question 2

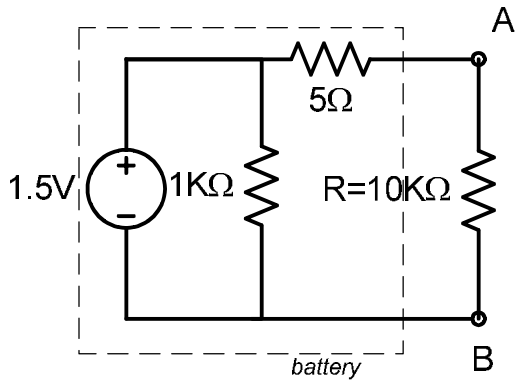
a) If a 1.5V DC battery is modeled as a 1.5V ideal source, with parallel and series resistances as shown in the diagram, calculate the value of the open-circuit voltage v_{ab}



b) If we short circuit terminals A and B, calculate the value of the short circuit current *Isc*



c) If a 10W resistor, R, is connected between terminals A and B as shown, what is the power supplied to R? What is the total power consumed in the circuit including the internal power dissipated inside the battery?

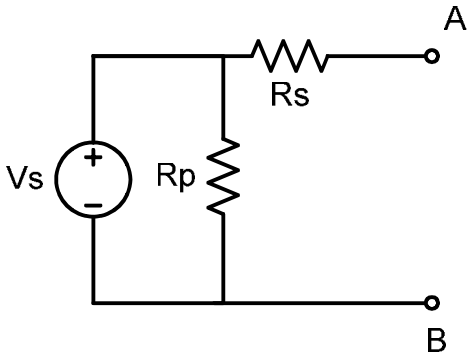


Question 3

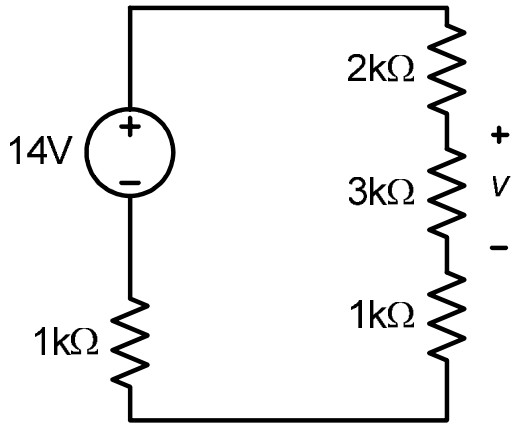
A non-ideal source (Battery) is modeled using the circuit below where A & B are the terminals of the battery. In order to determine the model parameters *Vs*, *Rs* and *Rp,* the following tests were performed:

1) The open circuit voltage was measured to be $v_{ab} = 9V$
2) The short circuit current was measured to be $I_{sc} = 0.5A$
3) The internal open-circuit power dissipation was measured to be $P_{int} = 0.1$ mW

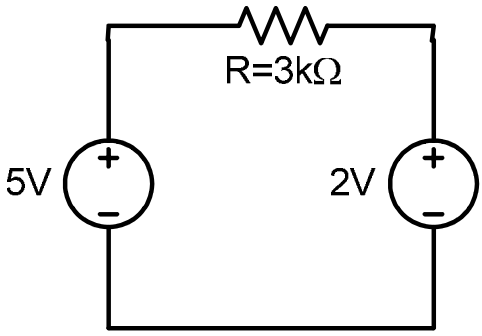
Determine the values of *Vs*, *Rs* and *Rp.*



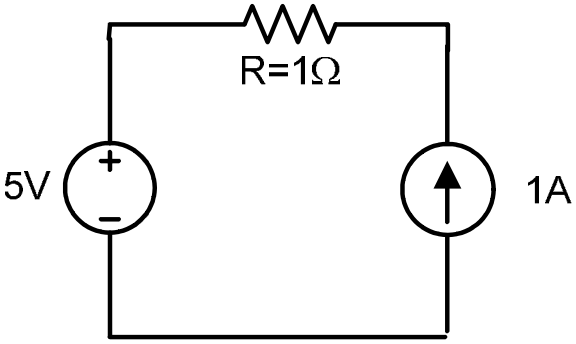
Question 4
For the given circuit, calculate the value of the voltage '*v*'



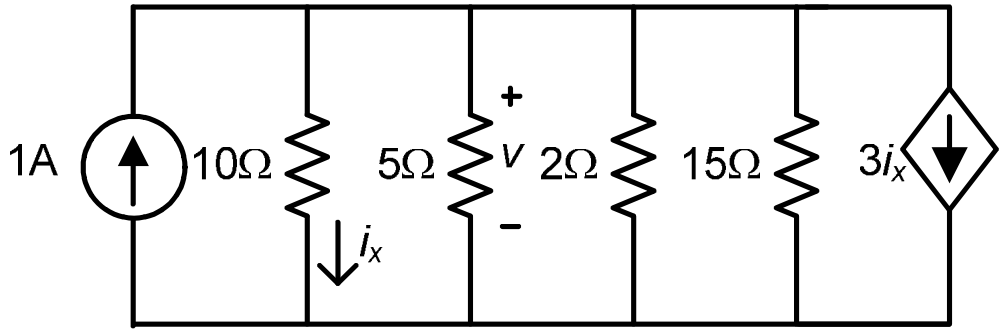
Question 5
For the given circuit, calculate the power consumed/supplied by each element



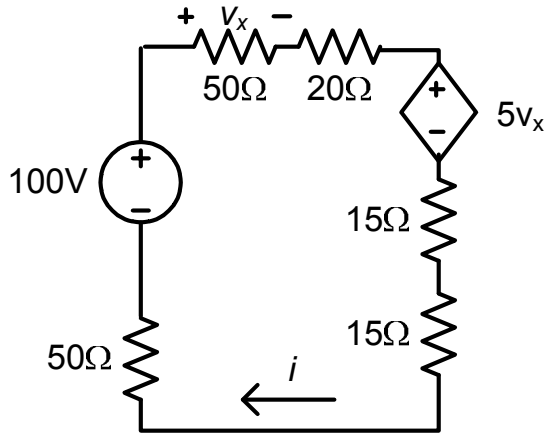
Question 6
For the given circuit, calculate the power consumed/supplied by each element



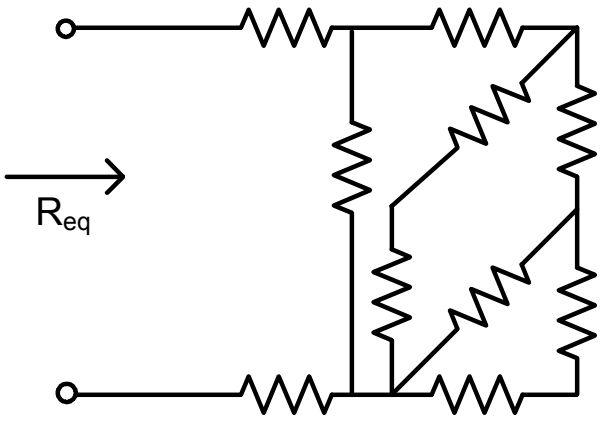
Question 7
For the circuit shown, calculate the value of the voltage '*v*' as defined



Question 8
For the circuit shown, calculate the value of the current '*i*' as defined.

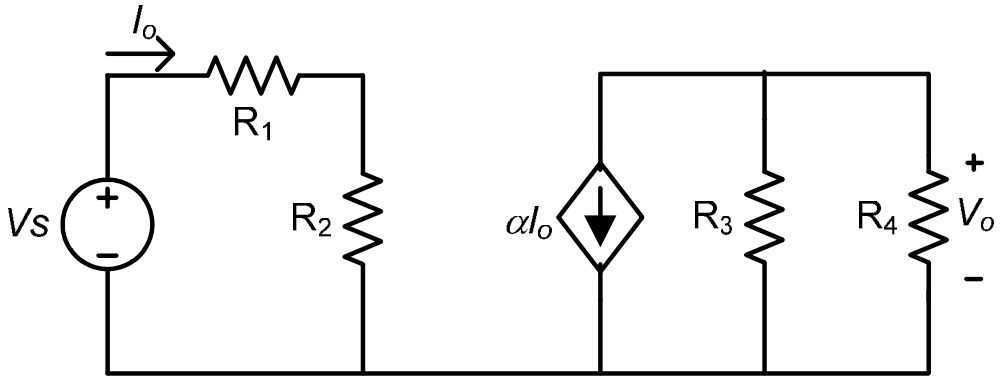


Question 9
For the circuit shown below, find the value of the equivalent resistance, Req. All resistors are 1Ω.



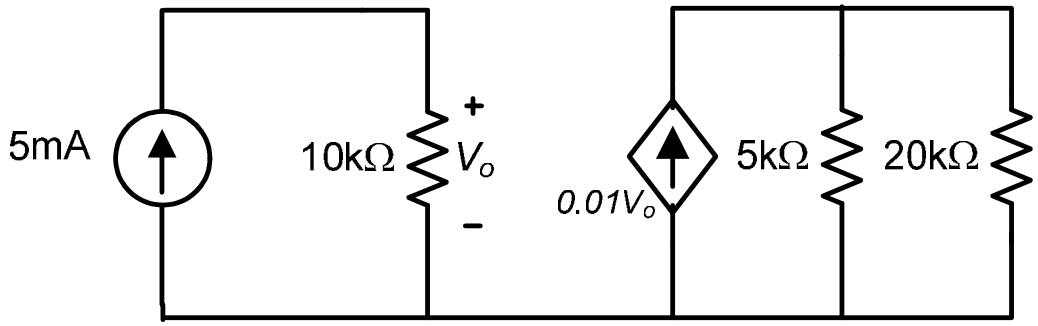
Question 10

For the circuit shown below, find V_o/V_s in terms of α, R_1, R_2, R_3, and R_4. If $R_1 = R_2 = R_3 = R_4$, what value of α will produce $|V_o/V_s| = 10$?



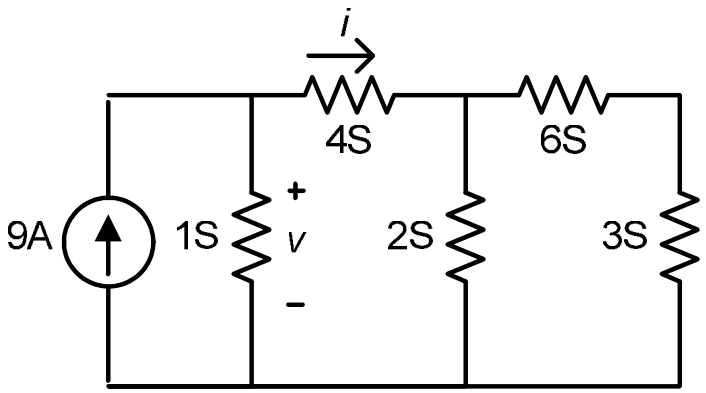
Question 11

For the network shown below, find the current, voltage, and power associated with the 20-kΩ resistor.



Question 12

Obtain the value of '*v*' and '*i*' in the following circuit



Question 13

For the circuit shown below,

a) Find the equivalent resistance R_{AB} seen by the source to the right of terminals A and B as shown in the following circuit.

b) Calculate the value of the voltage '*v*'.