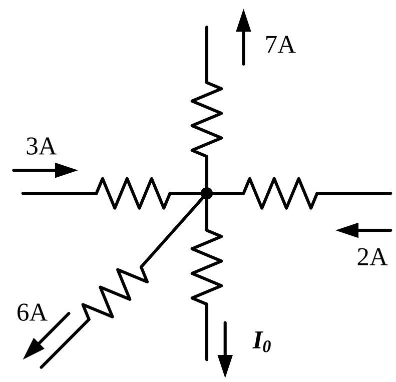
EE 109 Homework 1[1]

Name: ____

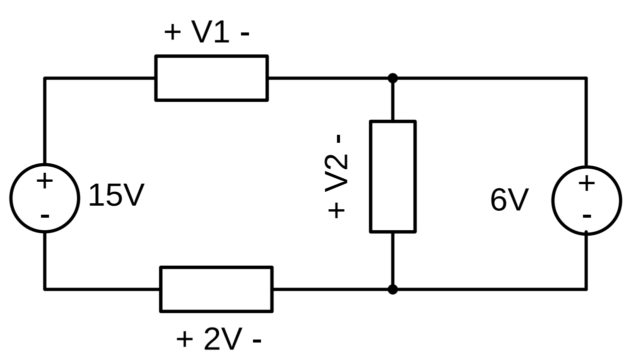
Due: See website **Score: ________**

Submit your answers on Blackboard.

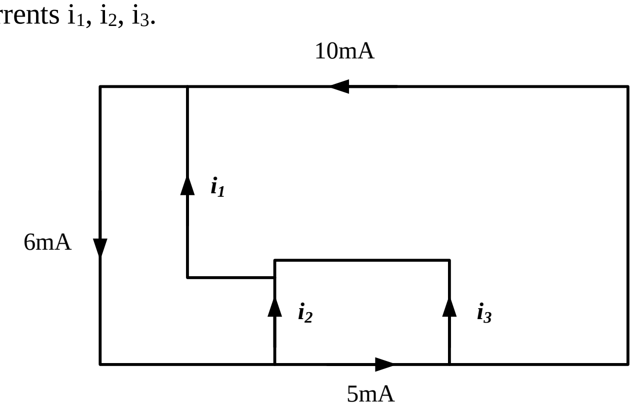
1.) **[5 pts.]** Use KCL to solve for I_0.



2.) **[8 pts.]** Use KVL to solve for V1 and V2.

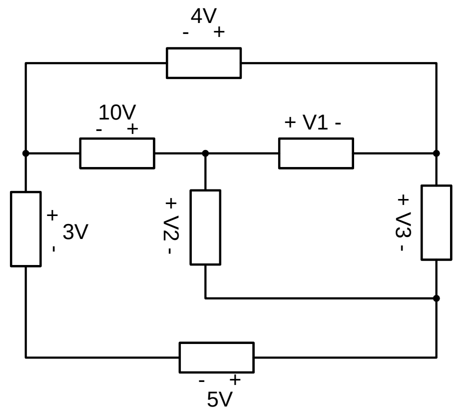


3.) **[9 pts.]** Solve for the currents i_1, i_2, i_3.

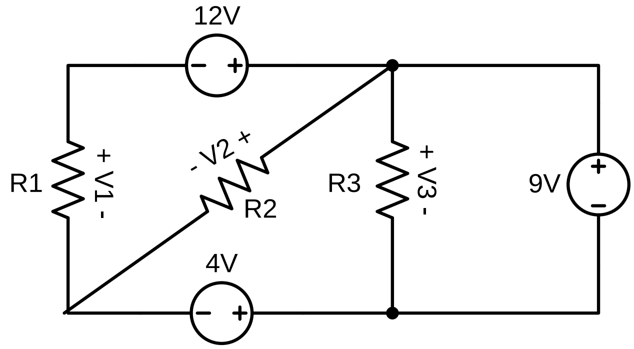


[1] Many of these exercises were derived or inspired from Fundamentals of Electric Circuits, 3rd ed. By Alexander, Sadiku. McGraw-Hill Publishers.

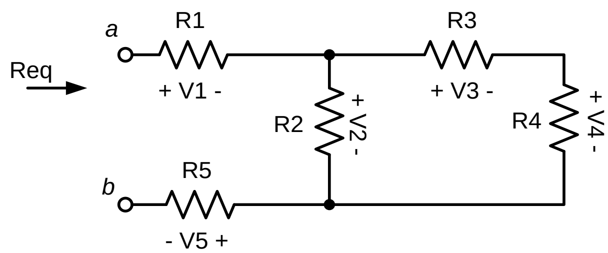
4.) **[9 pts.]** Solve for the voltages V1, V2, V3



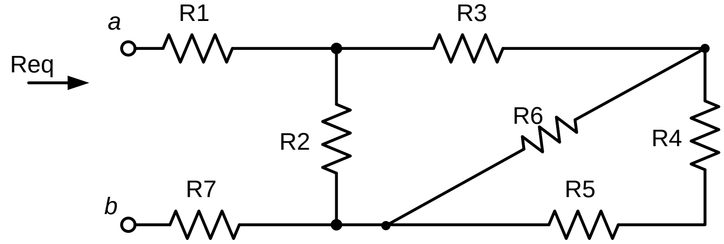
5.) **[9 pts.]** Solve for the voltages V1, V2, V3 across the respective resistors.



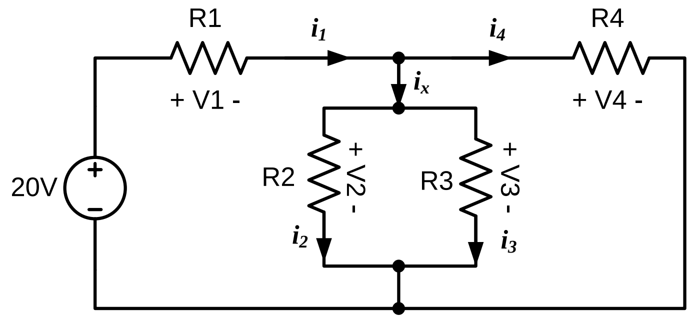
6.) **[10 pts.]** Reduce the resistor network shown below to a single equivalent resistance. Assume the values of the resistors are given as R1=3Ω, R2=4Ω, R3=2Ω, R4=2Ω, R5=1Ω.



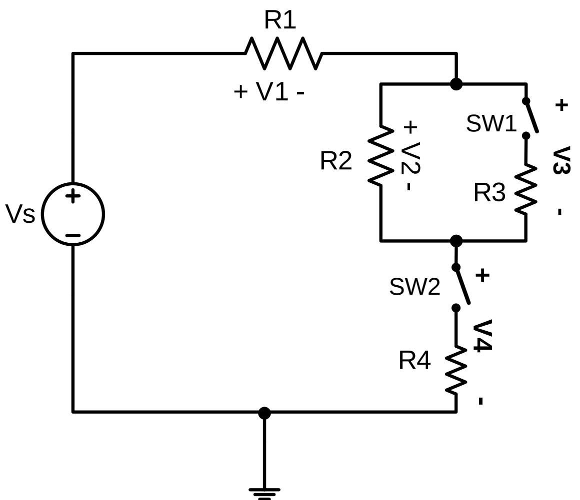
7.) **[10 pts.]** Reduce the resistor network shown below to a single equivalent resistance assuming the following resistor values: R1=5Ω, R2=4Ω, R3=3Ω, R4=1Ω, R5=1Ω, R6=2Ω, R7=7Ω.
Hint: Start by combining R4 and R5 then combine those with R6 and keep going…



8.) **[8 pts.]** Find an expression for the current ***i1*** if R1=4Ω, R2=3Ω, R3=6Ω, R4=2Ω.
Hint: Combine R2, R3, R4 into an equivalent resistance which will be in series with R1. From here you can use a KVL loop or Ohm's law to solve for i1.



9.) **[16 pts.]** In the circuit below, assume that SW1 and SW2 is closed (connected) **[Note: the diagram below shows the switches in the open position. But assume they are closed for this problem]**. Use the generalized concept of a voltage divider (review your notes/lecture slides) to find expressions for the voltage V1 and V4 in the circuit below. Your expression should be in terms of Vs and R1-R4.



Note: V3 is the voltage across the series of SW1 and R3

Note: V4 is the voltage across the series of SW2 and R4

10.) **[6 pts.]** Look at the circuit from problem 9 and reuse the equation you found. If SW2 is now open (not connected) but SW1 is still closed (connected) derive an expression for V4 (voltage across SW2 and R4)? Your expression should be in terms of Vs and (possibly) some of R1-R4.
Hint: Remember a switch can be modeled as either a VERY LARGE (infinite) resistance or VERY SMALL (zero) resistance. With SW2 open, what resistance value can be used to model the effect of SW2 and R4?

11.) **[5 pts.]** Look at the circuit from problem 9. If SW1 is now open (not connected) but SW2 is closed (connected) again, derive an expression for **V4** (not V3). Your expression should be in terms of Vs and (possibly) some of R1-R4. Using the hint from the previous problem consider what resistance value can be used to model the effect of SW1 and R3?

12.) **[5 pts.]** Look at the circuit from problem 9. If both SW1 and SW2 are closed (connected) AND now R3 is effectively changed 0Ω (i.e. replaced by a wire), solve (approximately) for the voltage **V4**? Your expression should be in terms of Vs and (possibly) some of R1-R4.