EE 109 Homework 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 $V_1$ and $V_2$.

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

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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 $i_1$ if $R_1=4\Omega$, $R_2=3\Omega$, $R_3=6\Omega$, $R_4=2\Omega$.
Hint: Combine $R_2$, $R_3$, $R_4$ into an equivalent resistance which will be in series with $R_1$. From here you can use a KVL loop or Ohm's law to solve for $i_1$.

Hint: Use your equation from the previous problem and let $R_4$ go to infinity.

9.) [16 pts.] Use the generalized concept of a voltage divider (review your notes/lecture slides) to find expressions for the voltage $V_1$ and also $V_4$ in the circuit below. Your expression should be in terms of $Vs$ and $R_1$-$R_4$.

10.) [6 pts.] Look at the circuit from problem 9. If $R_4$ is very large (approaches infinity) what would $V_4$ be (approximately)? Your expression should be in terms of $Vs$ and (possibly) some of $R_1$-$R_4$.
Hint: Use your equation from the previous problem and let $R_4$ go to infinity.

11.) [5 pts.] Look at the circuit from problem 9. If $R_3$ is very large (approaches infinity) again solve (approximately) for the voltage $V_4$? Your expression should be in terms of $Vs$ and (possibly) some of $R_1$-$R_4$.
Hint: Use your equation from problem 9 and let $R_3$ go to infinity.

12.) [5 pts.] Look at the circuit from problem 9. If $R_3$ is effectively $0\Omega$ (i.e. replaced by a wire), solve (approximately) for the voltage $V_4$? Your expression should be in terms of $Vs$ and (possibly) some of $R_1$-$R_4$. 