ELEC 301 Problem Set #1

1. Find the Thevenin equivalent of the circuit shown in figure 1. Let the 2 kΩ resistor be the load (i.e., do not include it in the Thevenin equivalent circuit).

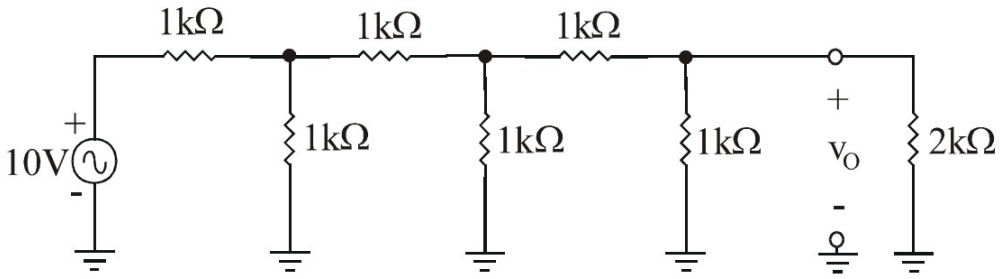

Figure 1.

2. Find both the Thevenin and Norton Equivalents of circuit shown in figure 2. Let the 1 kΩ resistor be the load.

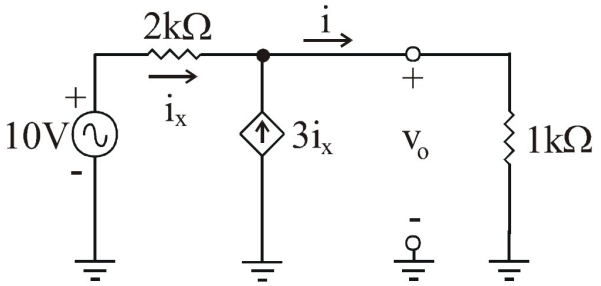

Figure 2.

3. Find the magnitude and phase of the complex impedance for (a) a 1 nH inductor, (b) a 1 mH inductor, (c) a 1 μH inductor, (d) a 1 pF capacitor, (e) a 1 nF capacitor, and (f) a 1 μF capacitor each at 1kH, 1 MHz, and at 1 GHz.

4. Find the magnitude and phase of the complex impedance of (a) a 1 kΩ resistor in series with a 10 pF capacitor, (b) a 1 kΩ resistor in parallel with a 10 pF capacitor, (c) a 100 Ω resistor in series with a 10 nF inductor, and (d) a 50 Ω resistor in parallel with a 100 pF capacitor, all at 1 MHz.

5. A voltage source provides and open circuit voltage of 10 V and a short circuit current of 1 mA, what is the internal resistance of the source? (answer: 10 kΩ).

6. A voltage source produces 1 V when loaded by a 100 kΩ resistor and 0.5 V when loaded by a 10 kΩ resistor. Calculate the Thevenin voltage, the Norton current, and the internal resistance. (answers: $V_T = 1.125V$, $I_N = 0.09$ mA, and $R_S = 12.5$ kΩ).