Practice Electronics Exam #1

Passive devices and circuits

Instructions:

Please give complete answers that explain/justify your results. This is the key to getting partial credit. You are free to use your 8.5x11 note sheet and to ask questions of me. No other resources are allowed.

Write all work and answers on the blank paper provided and staple your question sheet to the top when you turn in your exam.

1. (8pts) In the following circuit schematic,
   a. What is the voltage across R_3?
   b. If you didn't explicitly use Kirchhoff's rules to solve part a, use his rules to write down the three equations you would to solve simultaneously to find all the currents in this circuit.
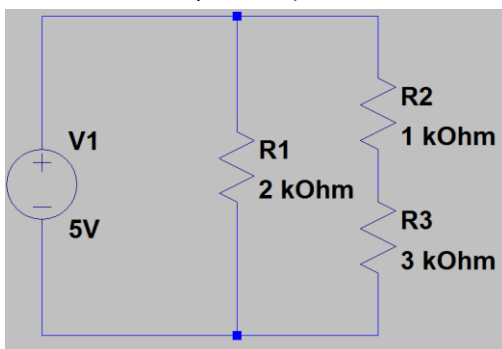

Figure 1: The power supply is 5VDC

2. (4pts) In the following circuit schematic
   a. Calculate the impedance of the resistor, capacitor, and inductor.
   b. Which will have the largest impedance if the power supply frequency is doubled?
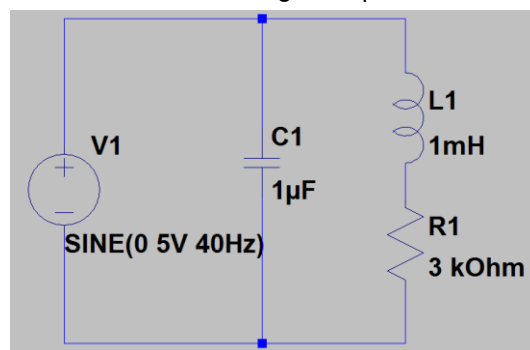

Figure 2: The power supply is AC and has an amplitude of 5V and a frequency of 40Hz.

3. (12pts) In the following circuit schematic determine the mean power dissipated by
   a. the capacitor and
   b. the resistor.

C1
0.01μ

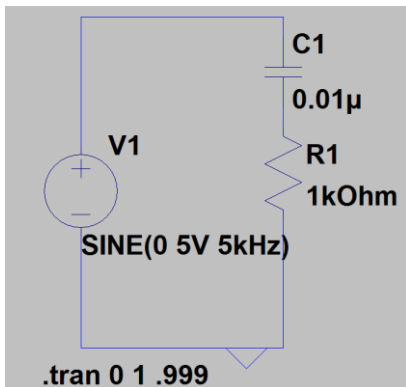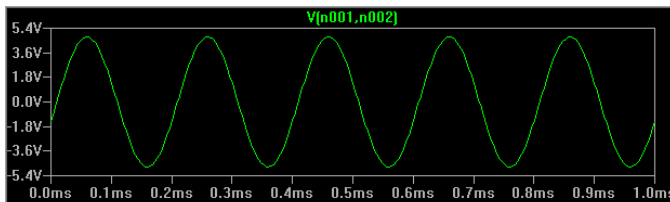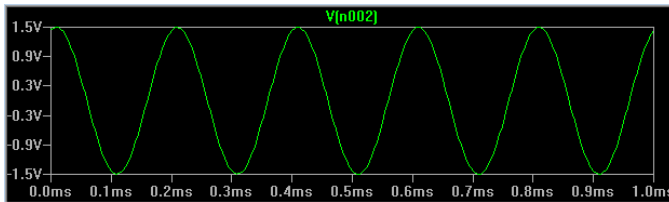V1

R1
1kOhm

SINE(0 5V 5kHz)

.tran 0 1 .999

Figure 3: Circuit Schematic, power supply has amplitude of 5V at 5kHz frequency.
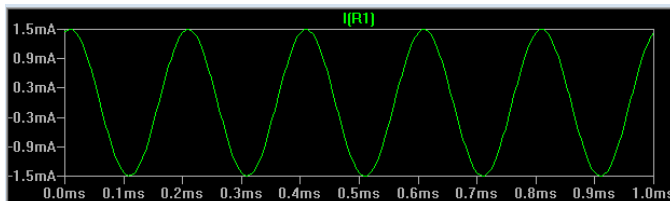
V(n001,n002)

Voltage across capacitor.

Figure 4: Voltage across the capacitor.

V(n002)

Voltage across resistor

Figure 5: Voltage across the resistor.

I(R1)

Current through capacitor

Figure 6: Current through the capacitor.

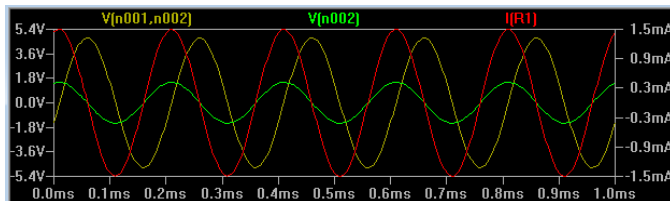V(n001,n002)   V(n002)   I(R1)

Figure 7: All three on the same graph.

4. (8pts) Measure voltage across and current through resistor R_1 in the circuit labeled Question #4.
    a. Report your voltage value and a sketch of the circuit showing the voltmeter you inserted.
    b. Report your current value and a sketch of the circuit showing the ammeter you inserted.
5. (6pts) Draw schematic for a circuit that contains
    a. a voltage divider.
    b. a current divider.
6. (8pts) Start with the circuit in Figure 8 and then:
    a. Sketch the circuit with a real volt meter (input impedance of $1M\Omega$) connected across R_1
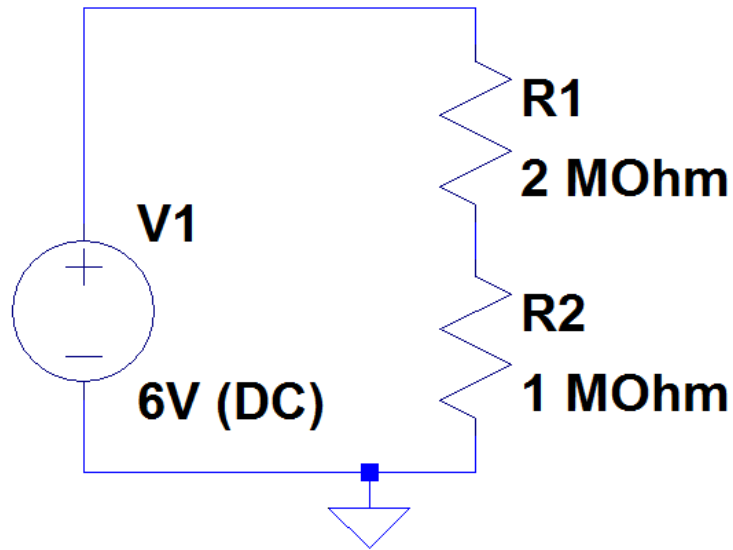   b. Calculate the voltage that meter will detect.

Figure 8 DC circuit for question 6.