

ECE 211: Homework #1

CircuitLab, Matlab, & Lab Kit

Voltage, Current, Resistance, & Power

1) Determine the remaining terms given the following information. Use the equations

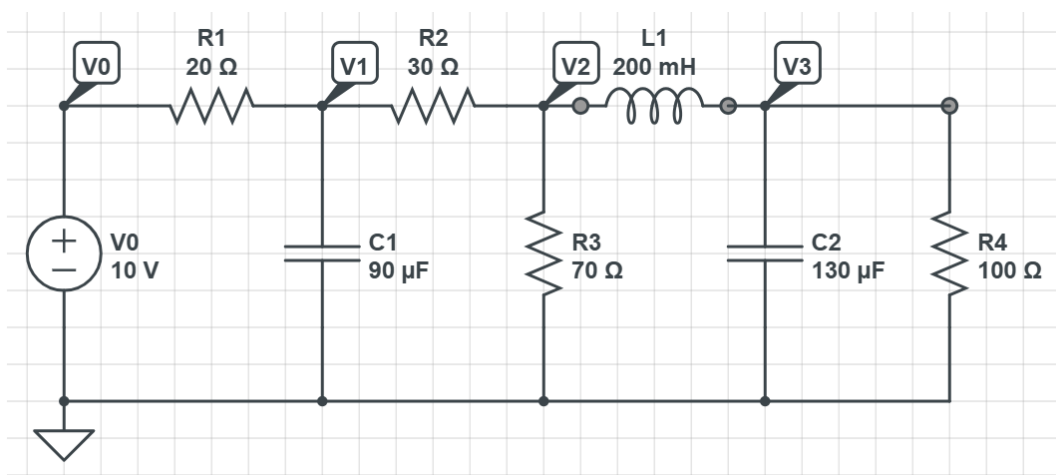
- $V = IR$
- $P = VI$

Volts (V)	Amps (I)	Ohms (R)	Watts (P)
10	2		
10		4	
	3		20
10			40

CircuitLab

2) Register with CircuitLab (use your @ndsu.edu email address to register and it's free).

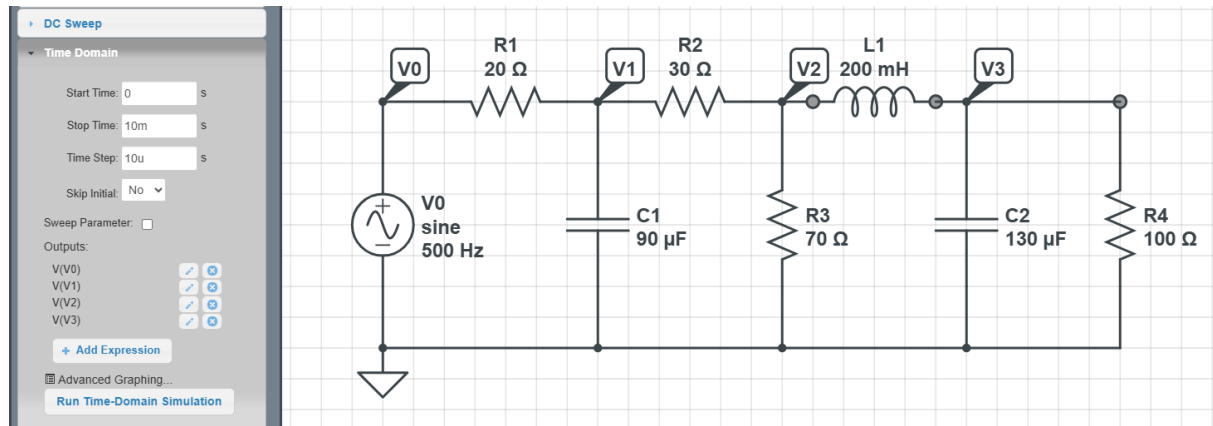
3) Build the following circuit in CircuitLab and find the voltages at {V0, V1, V2, V3} when V0 is a 10V DC source. Include a screen-shot of the CircuitLab results.



4) Change V0 to a 500Hz sine wave that's 10V peak. for V0 = 10V (DC) source

- Run a time-domain simulation
- Max time = 2ms (4 cycles)
- Time step = 2us (1000 points on the plot)

Include a screen shot of the resulting graph from CircuitLab



Matlab

5) Using Matab, solve for {x, y, z}

$$2x + 3y + 4z = 7$$

$$7x + 2y - 2z = 12$$

$$x + y + z = 10$$

6) Use Matlab to solve for {x, y, z}

$$2x + 3y + 8z = 2 + 3j$$

$$4x - (7j)y + (1 + 2j)z = 0$$

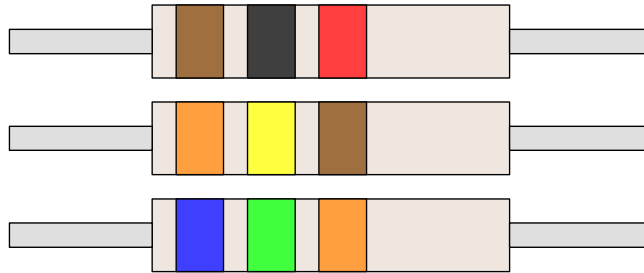
$$8x + (1 - 2j)y + 3z = 5$$

Resistors & Color Code

black	brown	red	orange	yellow	green	blue	violet	grey	white
0	1	2	3	4	5	6	7	8	9

7) Using the color code for resistors, determine the resistance for the following colors

- brown - black - red
- orange - yellow - brown
- blue - green - orange



FNRSI Multimeter (Lab Kit)

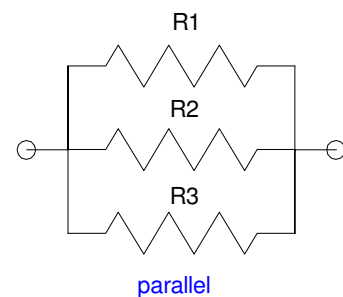
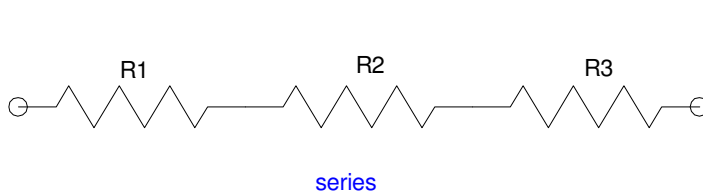
8) Grab three resistors with different values (different color bands) from your lab kit

- Determine the value of these resistors using the color bands
- Determine the resistance using your multimeter

9) Using a multimeter (there should be a FNRSI multimeter in your lab kit), measure the resistance of

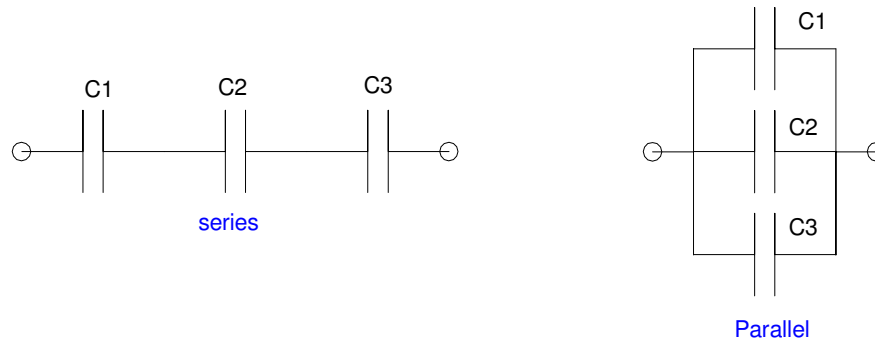
- Three resistors (at random)
- These same three resistors in series
- These same three resistors in parallel

Include a photo of your multimeter with one of these readings



10) Using a multimeter (there should be a FNRSI multimeter in your lab kit), measure the resistance of

- Three capacitors (at random)
- These same three capacitors in series
- These same three capacitors in parallel



Fun with Resistors

11) The resistance of the thermistor in your lab kit is approximately

$$R = 2000 \cdot \exp\left(\frac{3905}{T+273} - \frac{3905}{298}\right) \Omega$$

Measure the resistance with your FNRSI meter

- In your room
- In a refrigerator
- In a freezer

From these measurements, compute the temperature

