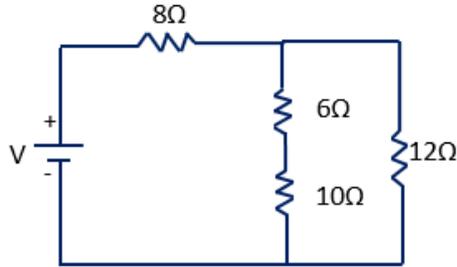
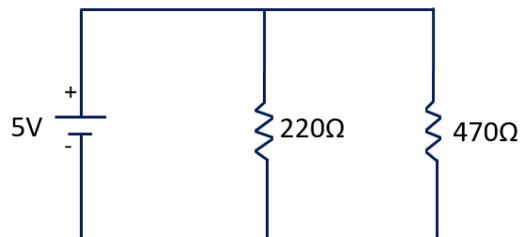


**NOTE:** Use engineering format for problems 1-5. Use non-engineering format problems 6 and 7. This is an individual assignment.

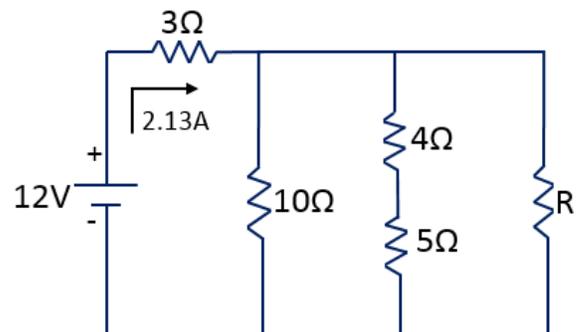
- The number of electrons leaving the negative end of the power source over a time of 6.5s is  $2.45 \times 10^{18}$ . What is the voltage drop over the  $12\Omega$  resistor?  $\Delta V_{12\Omega} = 0.41V$



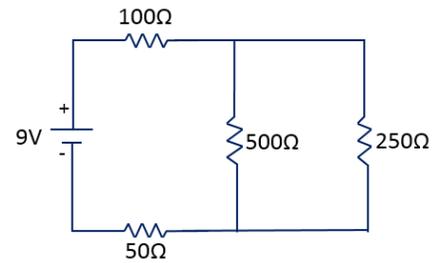
- Consider the circuit given. Find:
  - Current leaving the power source.  $I = 33mA$
  - Current through each of the resistors.  
 $I_{220\Omega} = 22.7mA$  and  $I_{470\Omega} = 10.6mA$
  - Voltage drop across each of the resistors.  $\Delta V_{220\Omega} = 5V$  and  $\Delta V_{470\Omega} = 5V$
  - Power dissipated by the circuit.  $P = 165mW$   
Power dissipated by each resistor individually.  $P_{220\Omega} = 114mW$  and  $P_{470\Omega} = 53mW$



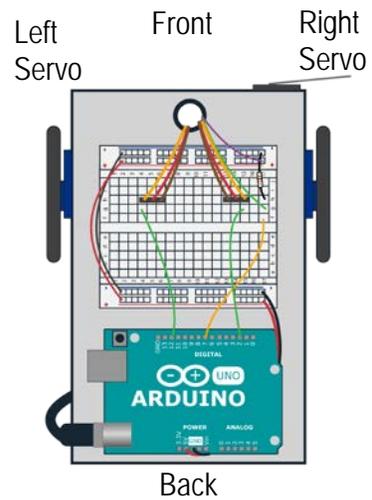
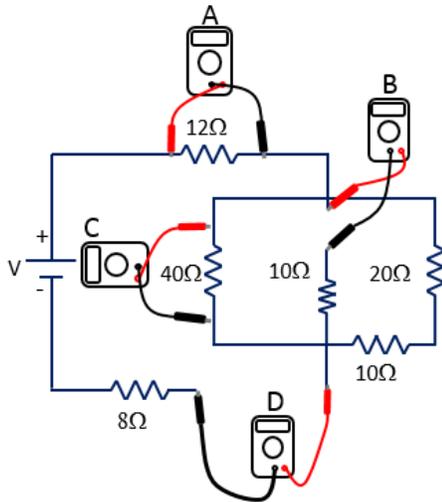
- Consider the circuit given has 2.13A of current leaving the power source. Find:
  - Voltage Drop across the  $3\Omega$  resistor.  
 $\Delta V_{3\Omega} = 6.4V$
  - Voltage Drop across R.  $\Delta V_R = 5.6V$
  - Current through the  $10\Omega$  resistor.  
 $I_{10\Omega} = 0.56A$
  - Current through the  $4\Omega$  and  $5\Omega$  resistors.  
 $I_{4\Omega} = 0.62A$  and  $I_{5\Omega} = 0.62A$
  - Current through R.  $I_R = 0.95A$
  - Value of R.  $R = 5.9\Omega$
  - Power dissipated by R.  $P_R = 5.3W$



4. Consider the circuit given. Find:
- Explain how voltage drops across each resistor. Keep KVL in mind.
  - Find current leaving the power source.  $I=28.4\text{mA}$
  - Do any of the other resistors have the same current value? If so, which one(s)?
  - Voltage drop across the  $100\Omega$  resistor.  $\Delta V_{100\Omega}=2.84\text{V}$
  - Voltage drop across the  $50\Omega$  resistor.  $\Delta V_{50\Omega}=1.42\text{V}$
  - Voltage drop across the  $500\Omega$  resistor.  $\Delta V_{500\Omega}=4.74\text{V}$
  - Voltage drop across the  $250\Omega$  resistor.  $\Delta V_{250\Omega}=4.74\text{V}$
  - Current through the  $500\Omega$  resistor.  $I_{500\Omega}=9.48\text{mA}$
  - Current through the  $250\Omega$  resistor.  $I_{250\Omega}=18.96\text{mA}$



5. The multimeters are connected to measure voltage or current for the given circuit. If multimeter C reads  $3.84\text{V}$  and multimeter D reads  $0.68\text{A}$ , then find
- The value read by multimeter A.  $\text{Multimeter}_A = 8.16\text{V}$
  - The value read by multimeter B.  $\text{Multimeter}_B = 0.384\text{A}$



6. Get both of your servos working. Use the Arduino pictured above for reference when answering the questions below.
- Fill out the chart for each pulse width value. Indicate direction where CW means clockwise, CCW means counter clockwise. Indicate speed using terminology like fast, faster, fastest, slow, slower, slowest, and stopped.

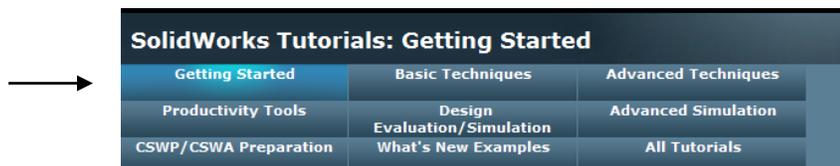
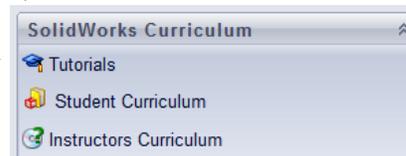
Pulse Width	Right Servo		Left Servo	
	Direction	Speed	Direction	Speed
1000				
1200				
1400				
1500				
1600				
1800				
2000				

- b. Program your Arduino to go forward for a short time and then make a wide left turn. Include a screenshot of the code.
  - c. Discuss the pulse values needed to make the Arduino go straight. Are they the same for both servos? Explain why or why not.
  - d. Fill in the blanks:  
When the Arduino moves full speed forward, the pulse width for the right servo is set to \_\_\_\_\_ and the pulse width for the left servo is set to \_\_\_\_\_. When the Arduino moves full speed reverse, the pulse width for the right servo is set to \_\_\_\_\_ and the pulse width for the left servo is set to \_\_\_\_\_.
  - e. Discuss the pulse values needed to make the wide left turn.
  - f. Challenge: Take input from a whisker to tell your Arduino to start the motion described in part b. This is an additional challenge ... if you don't get it working, that's okay.
7. Complete the SolidWorks tutorial indicated below. This will take some time to complete. Please allot yourself enough time to work on this tutorial. Follow each step very carefully. Do not be deterred if you have to start over.

NOTE: If you are having issues with installing SolidWorks on your computer you can use the University's' virtual workspace. Please see the end of this document for instructions on how to install and use the virtual workspace.

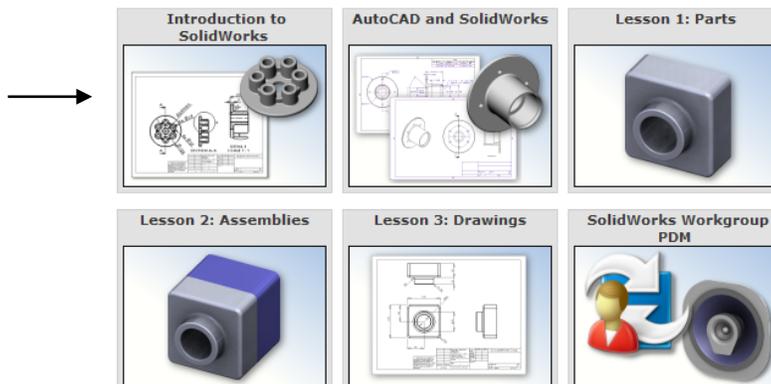
Print out two screen shots as you create the part, one at an intermediate point in the process and another one showing the final 3D part. Also print out a third screen shot showing an intermediate step of creating the final drawing (such as after you create the section view). To start the tutorial,

- Open SolidWorks
- Click on "Tutorials" →
- Click on the "Getting Started"
- Click on "Introduction to SolidWorks"



These tutorials present SolidWorks functionality in an example-based learning format. For details about typographical conventions and how to navigate through these tutorials, see [Conventions](#).

If you are new to the SolidWorks software, familiarize yourself with the tutorials in **Getting Started** first. For examples of What's New in SolidWorks for this release, see **What's New Examples**. All other tutorials can be completed in any order.



## Installing and Using the Virtual Workspace Instructions

This is not a homework problem. Follow these instructions only if you have been unable to install SolidWorks on your computer.

**Step 1:** Navigate to anywhere.latech.edu on a browser

**Step 2:** Choose College of Engineering and Science



**Step 3:** If the vWorkspace connector is not installed, you must install it. Click Install.

**Step 4:** Run through the steps of .exe file. You may also need to install Adobe Flash Player for the virtual workspace to work.

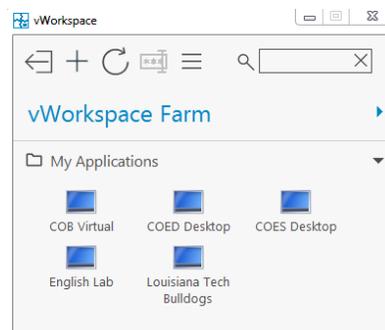
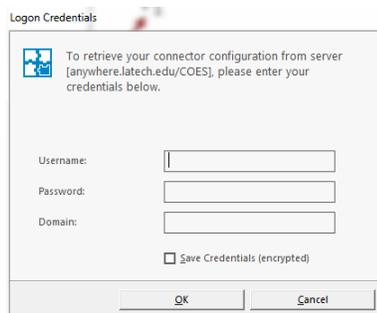
**Step 5:** Press retry, and you will likely be told the installation worked and to close the window.

**Step 6:** An icon will be placed on your desktop called vWorkspace. Click this icon and you will be asked for login credentials.



**Step 7:** Enter your credentials.

- Username: same as your Tech email username
- Password: same as your Tech email password
- Domain: AD3



**Step 8:** vWorkspace Farm window will open. Choose COES Desktop.

**Note:** You should be able to access the vWorkspace. You can use SolidWorks, Mathcad and any other COES program found on the workspace. Do not save anything to the workspace. It will be accessible to all that use the workspace. Instead, be sure to save files to the cloud (e.g.; Google Drive or Dropbox).

