**ENGR 120**   **Homework 2**

NOTE: Use the non-engineering format discussed in class for problems 1-4 and 7, and use engineering format for problems 5 and 6. This is an individual assignment. You must complete the assignment on your own, although you may discuss the problems with other class members (but no copying of work).

1. All students must install SolidWorks to participate in ENGR 120. Your instructor should let you know when your section will be installing SolidWorks during helpdesk hours.
   a. Write down the day and time for your class' installation and turn that information in with this homework.
   b. Plan to attend the session in Bogard Hall 129 on the date listed to install SolidWorks. Please see your instructor if you are unable to meet at the designated time for your section.

2. Work toward completing the assembly of your robot, with the goal of having everything together in two classes from now (one week from now). Visit the Living with the Lab HelpDesk in Bogard Hall 129 if you still need to punch holes outside of class. You do not need to attach a battery pack at this time.

3. Search the Internet for "Arduino" to locate the Arduino homepage (www.arduino.cc/). Visit the Arduino website and complete the following:
   o Click on "Getting Started" (found under the "Learning" tab)
   o Click on the appropriate operating system for your computer (Windows, Mac, Linux)
   o Follow the directions to . . .
      ▪ Download the Ardiuno environment
      ▪ Connect the board
      ▪ Install the drivers (Done automatically with Windows Installer once you connect your Arduino to your computer)
      ▪ Launch the Ardiuno application on your computer
      ▪ Open the blink example (File→Examples→Basics→Blink)
      ▪ Select your board (Tools→Board→Arduino/Genuino Uno)
      ▪ Select your serial port (Tools→Port:→Choose the port associated with your Arduino)
      ▪ Upload the program
   o Your program should cause the on-board LED to blink
      ▪ NOTE: The order of the above items depends on your operating system. Regardless of your operating system, you should follow the steps required to make the LED blink.

   Answer the following questions for this problem:
   a. Were you able to get the Arduino to communicate with your computer? If not, describe your problems. It's not unusual for students to have trouble, so please visit your instructor if you had installation issues. If so, then answer questions b through f below.
   b. What happens to the orange LEDs labeled "TX" and "RX" when you upload the program?
   c. Note that the values of the "delay" commands in the program are "1000". What happens when you vary these numbers? That is, what happens if you set them to 500? Do you see any changes?
   d. What do you think the "delay" command might be doing?
   e. Click on the "language" link under "Reference" on the main Arduino webpage. Click on the "delay()" command and describe what you find (a sentence or two is good).
   f. Include a printout of your modified program with your homework (a screen capture would be an easy way to do this).

4. Given the resistors shown below, determine the value of resistance for each resistor.

a.

Brown   Black   Orange

b.

Red   Green   Red

c.

Yellow   Violet   Red

d.

Blue   Green   Brown
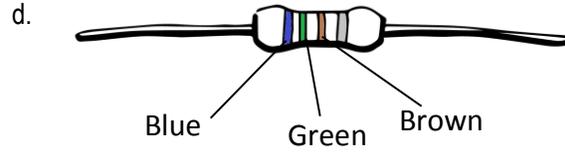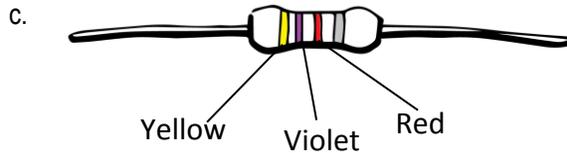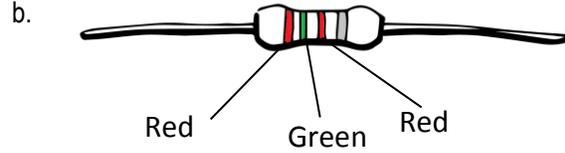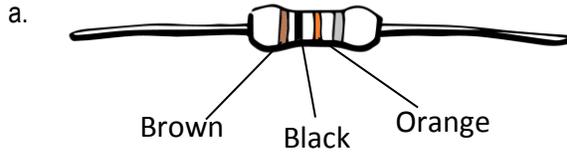
5. A flashlight which uses 2 D-cells to form a voltage of 3 volts uses a bulb with a resistance of 75Ω.
   a. Draw a circuit diagram of the flashlight (using standard symbols for the voltage source and the resistor).
   b. Determine the current passing through the circuit. I = 0.04A
   c. Determine the number of electrons passing through the circuit if the flashlight is left on for 5 minutes. # of Electrons = 7.488×10^{19} e-

6. For the circuit shown, Determine,
   a. The current leaving the power source if the conductor carries a charge of 1,200 C (coulombs) across it in 3 minutes? I = 6.67A
   b. Considering that the power source supplies 6V. Estimate the unknown resistance. R = 0.9Ω
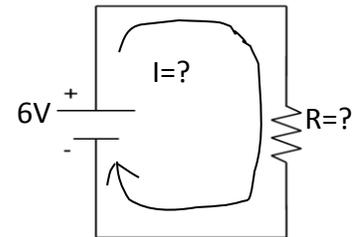
7. Please complete the Engineering Student Survey found on the META ENGR 120 Moodle page.