ENGR 120  Homework 7

NOTE: Use engineering format for problems 1-3. Use non-engineering format problems 4 and 5. This is an individual assignment.

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

2. Consider the circuit given has 2.13A of current leaving the power source. Find:
   a. Voltage Drop across the 3Ω resistor. \( \Delta V_{3\Omega} = 6.4\text{V} \)
   b. Voltage Drop across R. \( \Delta V_R = 5.6\text{V} \)
   c. Current through the 10Ω resistor. \( I_{10\Omega} = 0.56\text{A} \)
   d. Current through the 4Ω and 5Ω resistors. \( I_{4\Omega} = 0.62\text{A} \) and \( I_{5\Omega} = 0.62\text{A} \)
   e. Current through R. \( I_R = 0.95\text{A} \)
   f. Value of R. \( R = 5.9\Omega \)
   g. Power dissipated by R. \( P_R = 5.3\text{W} \)

3. Consider the circuit given. Find:
   a. Explain how voltage drops across each resistor. Keep KVL in mind.
   b. Find current leaving the power source. \( I = 28.4\text{mA} \)
   c. Do any of the other resistors have the same current value? If so, which one(s)?
   d. Voltage drop across the 1000Ω resistor. \( \Delta V_{1000\Omega} = 2.84\text{V} \)
   e. Voltage drop across the 50Ω resistor. \( \Delta V_{50\Omega} = 1.42\text{V} \)
   f. Voltage drop across the 5000Ω resistor. \( \Delta V_{5000\Omega} = 4.74\text{V} \)
   g. Voltage drop across the 2500Ω resistor. \( \Delta V_{2500\Omega} = 4.74\text{V} \)
   h. Current through the 500Ω resistor. \( I_{500\Omega} = 9.48\text{mA} \)
   i. Current through the 250Ω resistor. \( I_{250\Omega} = 18.96\text{mA} \)
4. Get both of your servos working.
   a. Write down the pulse value needed for each servo to be stopped (it is possible that the numbers may be different for your two servos).
   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. Discuss the pulse values needed to make the wide left turn.
   e. 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.

5. Complete the SolidWorks tutorial indicated below. 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”