University of Calgary
Department of Electrical and Computer Engineering

ENGG 225 - Fundamentals of Electrical Circuits and Machines
Winter, 2017

Problem Assignment #1

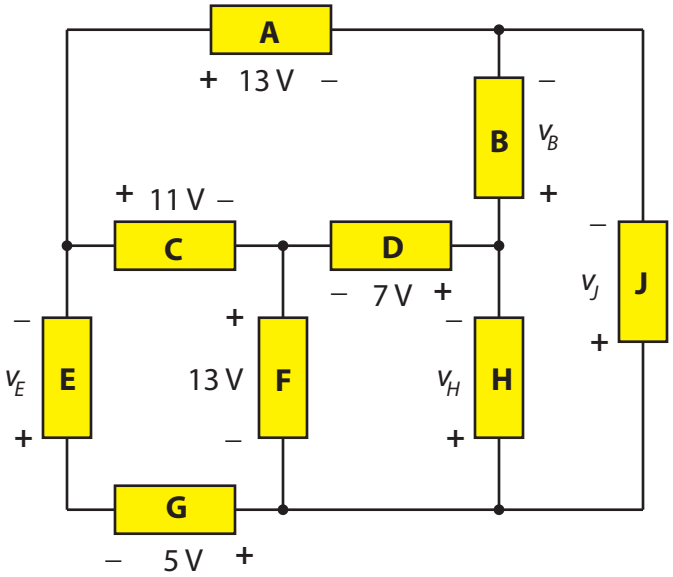
Comments on D2L Data Entry:

Calculate the numerical answers to the problems below, and enter them into `Quiz #1` *on* `D2L` *using four significant figures. For example, if an answer is 4.3957734, enter 4.396 when prompted by* `D2L`*. If an answer is a whole number, say -2, you may enter -2, -2.0, 2.00, or -2.000. For very large numbers or very small numbers, you may use scientific notation, such as 1.609e-19.*

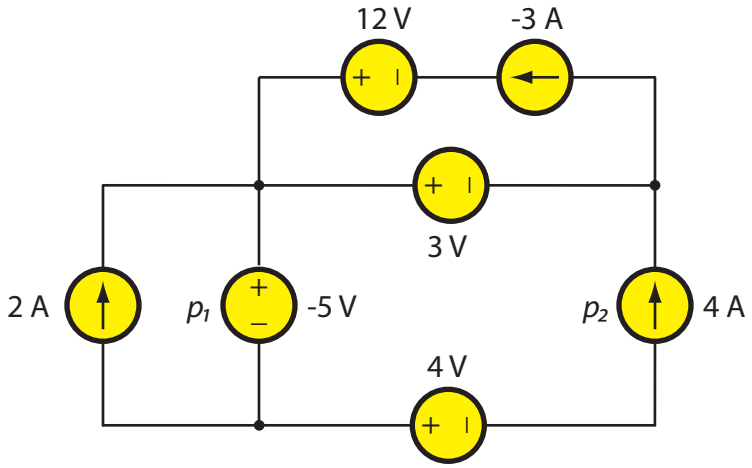
1. **[1 mark.]** A constant current of 4A for 20 hours is required to charge an automotive battery having a voltage at its terminals of $v(t) = 12(1 + e^{-t/20})$ V, where t is in hours. Assuming an electricity cost \$0.19 per KWh, what is the cost to charge the battery? Give your answer in dollars.

2. **[1 mark.]** The current flowing through a device is $i(t) = 120(1 + \cos(100\pi t))$ A. Calculate the total charge flow through the device over one period from $t = 0$ to $t = 10$ ms. Express your answer in Coulombs.

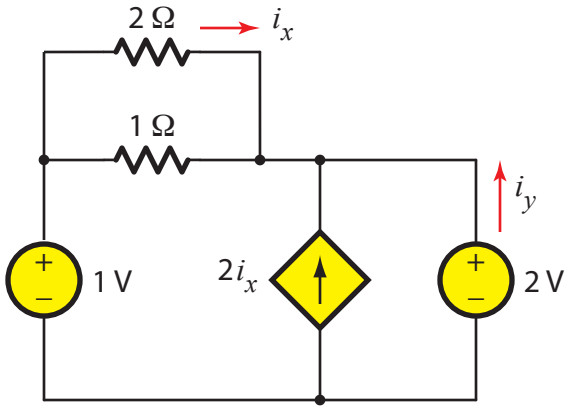
3. **[1 mark.]** Find $v_E + v_H + v_J$ in the following circuit. Express your answer in Volts.



4. **[2 mark.]** In the circuit below, use KVL and KCL to determine the power $p_1 + p_2$. Express your answer in Watts using the correct sign.



5. **[2 marks.]** In the circuit below, use KCL, KVL, and Ohm's Law to determine the current i_y in the 2 V source. Express your answer in Amperes.



6. **[2 mark.]** Use KCL, KVL, and Ohm's Law to determine the power in the voltage source below. Express your answer in Watts using the correct sign.