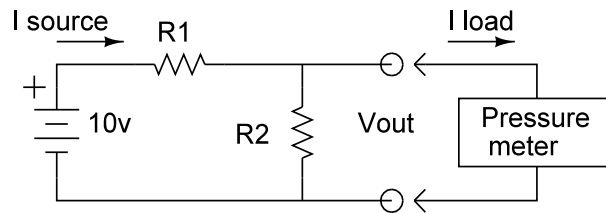


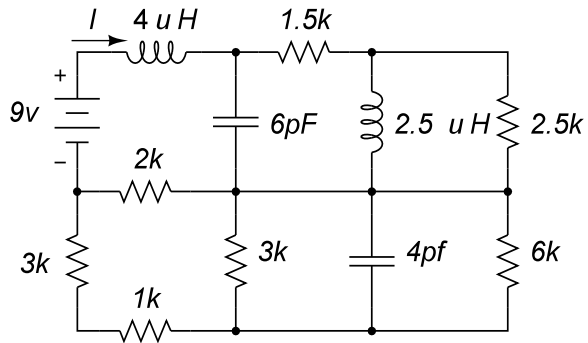
ENGR-384 Bio-instrumentation
HW # 1

- 1) Assume that you have a piece of test equipment, lets say a pressure meter, that needs a source of DC power to operate. This particular meter needs 4 volts +/- 10% to operate properly. With a 4 volt supply the current is 20 milliamps (I_{load} in the diagram). You have a 10 volt fixed power supply at hand. Below is a possible circuit that could be used to power the meter with 4 volts where the battery symbol represents the power supply:



- a) Assume that R_2 is not in the circuit and only R_1 is used. Find a value for R_1 that makes the voltage across the pressure meter equal 4 volts. (hint: the pressure meter can be represented as a resistance)
- b) Continuing with R_2 out of the circuit, if the pressure meter is unhooked what will be the V_{out} voltage?
- c) Assume that you need to be able to connect the pressure meter to its power source with the power source turned on. It so happens out that for this particular pressure meter it isn't good to connect it to V_{out} if V_{out} is greater than 5 volts. So now put R_2 into the circuit as shown and find a value for R_2 that will cause V_{out} to be 5 volts when the pressure meter is not plugged in.
- d) With values for R_1 and R_2 now chosen per (c) above and with the pressure meter plugged in, what will be the value of V_{out} ? Will this voltage properly power the pressure meter?
- e) Redesign the circuit by choosing different values of R_1 and R_2 to meet the stated specifications, i.e. voltage to the pressure meter is 4v +/- 10% with it plugged in and without the pressure meter connected V_{out} is no greater than 5 volts.
- f) Using the values of R_1 and R_2 found in (e) above and with the pressure meter connected, what is the value of I_{source} ? What is the current I_{load} and also the current through R_2 ?
- g) If the voltage specification for the pressure meter was 4 volts +/- 1% would the circuit above be a good way to power it? Explain.

- 2) a) Calculate the value of I for the circuit below. Assume steady state, i.e. DC.
 b) Find the total power dissipated at steady state.



Submit homework to a dropbox on D2L.