Name _____

EE 2240

Final Exam

Thursday, December 14, 2017

LIBR B32 and TAB 115, 7:30AM – 9:30AM

Please read these comments and instructions before starting the exam:

There are 8 problems on this exam. Each problem is worth a maximum of 25 points. There will be very little partial credit, so please take your time and check your work.

This is an **open-book** exam, with **any additional paper-based resources you wish** and a **calculator** allowed. No other resources may be used – this means no cell phones, tablets, laptops or any other kind of device capable of electronic communication.

Books, other reference materials and calculators may not be shared.

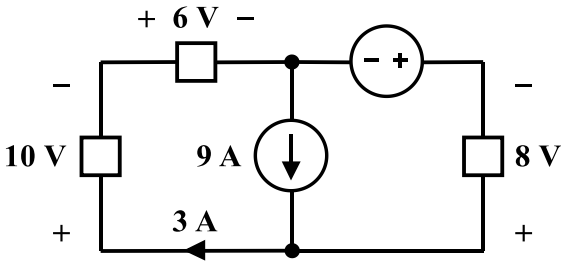
Clearly define any variables you define for use in your solutions (Show them on the circuit diagram.) and present your solutions in a neat and orderly manner. If a solution is difficult to follow, it's not worth as many points as one that is easy to follow.

Please do not ask for an explanation of any of the symbols, words, or concepts used in the makeup of this exam. All have been adequately described in class and, and I cannot disadvantage other students by providing additional explanation(s) just for one.

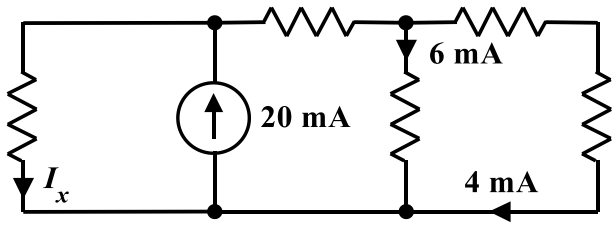
You may not leave the room for any reason once the exam has started. There are no restroom breaks allowed. If you feel a need to go, please turn in your exam and do not return. Your exam will not be returned to you.

You have 2 hours to finish the exam. Please note that your solutions must be submitted no later than 9:30AM.

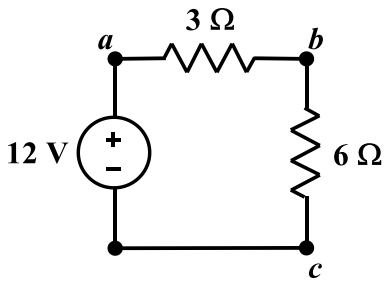
1. Is the independent voltage source *absorbing* or *delivering* power? How much? Show work to justify your answers.



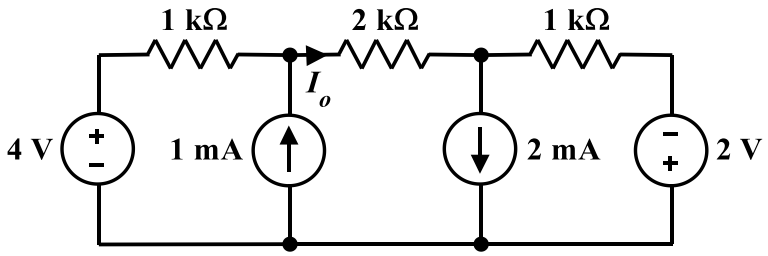
2. Find the numerical value, including sign, of I_x.



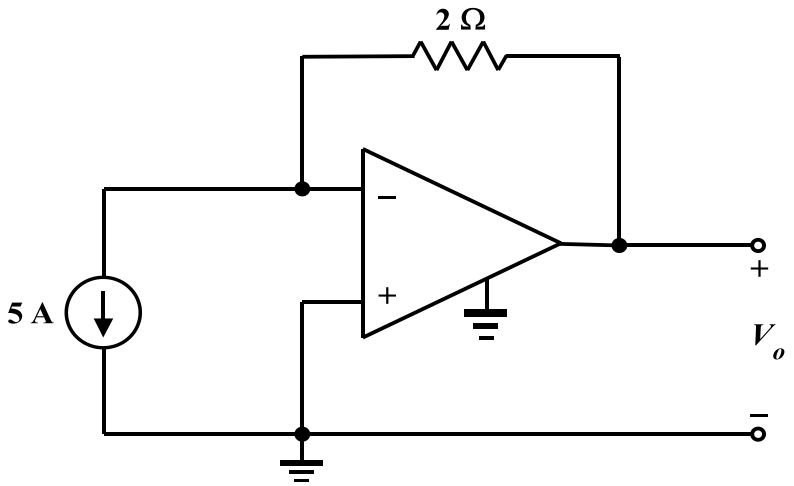
3. Find the numerical value, including sign, of V_{ab} .



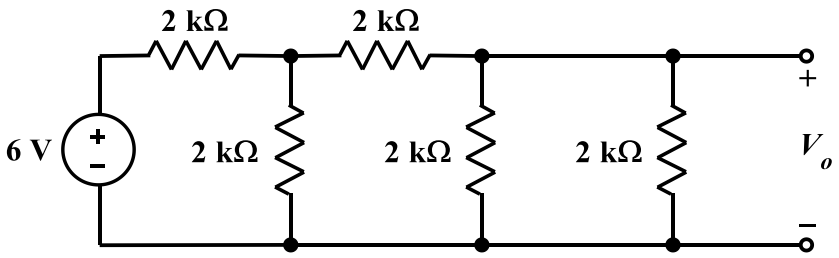
4. Find the numerical value, including sign, of I_o.



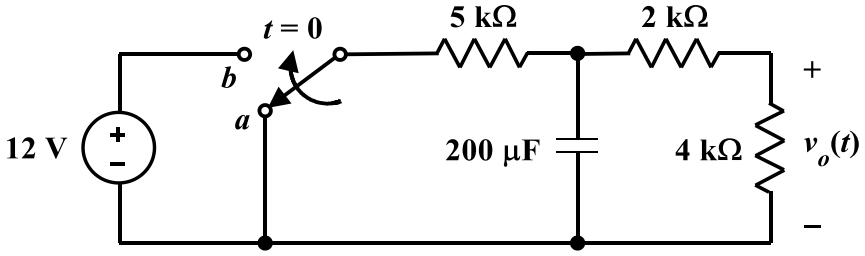
5. The operational amplifier is ideal. Determine the numerical value, including sign, of V_o.



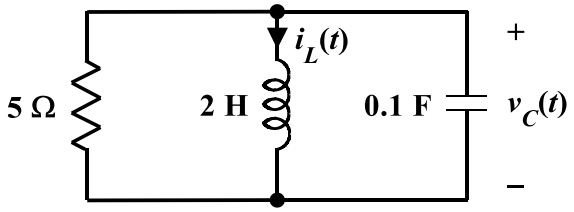
6. Find the numerical value, including sign, of V_o.



7. The switch has been in position *a* for a long time, and is suddenly thrown to position *b* at $t = 0$. Find $v_o(t)$ for $t \geq 0$.



8. The circuit shown below is an underdamped system, and the current through the inductor has the form $i_L(t) = e^{\alpha t}\left(\mathrm{K}_1 \sin \omega t + \mathrm{K}_2 \cos \omega t\right)$ A for $t \geq 0$.



a. Determine the numerical values, including signs, of α and ω.

b. If the initial conditions are $i_L(0) = 1\mathrm{A}$ and $v_C(0) = 12\,\mathrm{V}$, determine the numerical values, including signs, of K_1 and K_2.

c. Using the numbers determined above, write out the complete expression for $i_L(t)$.