ECE 35, Fall 2017

Final - Section B

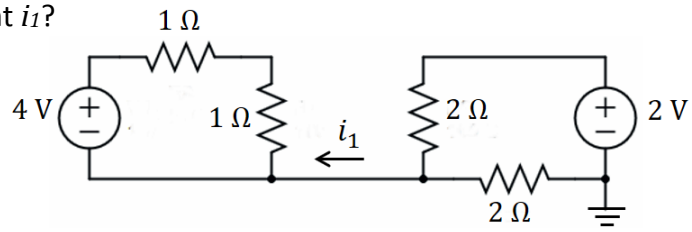
Last name	
First + middle name(s)	
PID	

Instructions:

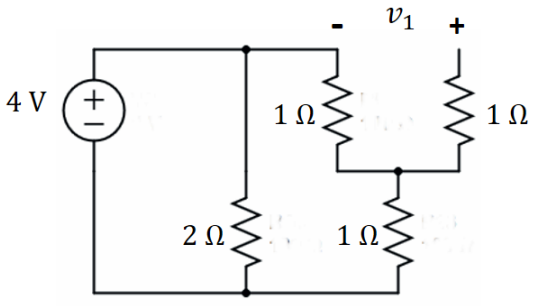
- Read each problem completely and thoroughly before beginning.
- All calculations should to be done in your blue book. It should be clear what question they belong to. Answers without supporting calculations will receive zero credit.
- Write clearly and make sure your answer is structured properly. We will not hunt for your work or answers.
- Write your final answers in the answer boxes on these question pages. Make sure you list units!

(1) Answer the questions below.

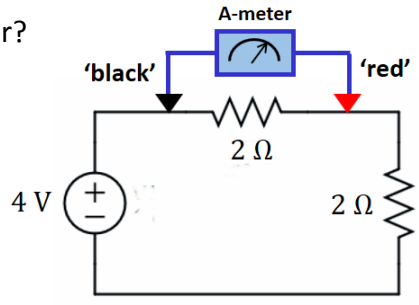
(a) What is the current i_1?



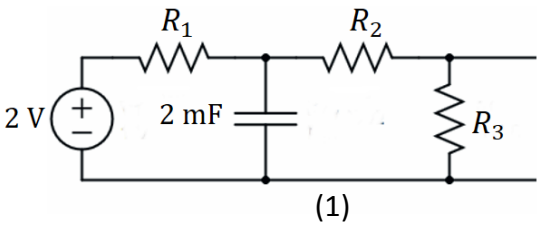
(b) What is the voltage v_1?



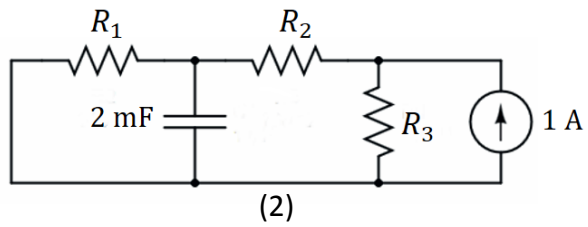
(c) What is the reading from the ammeter?



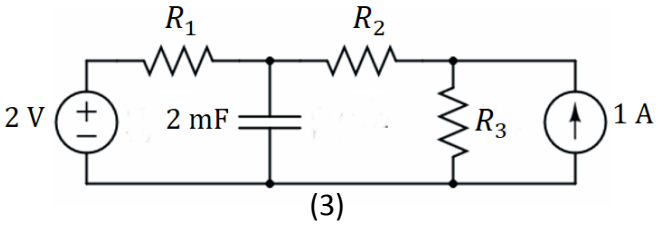
(d) The energy stored in the capacitor in scenario (1) is 1 mJ and in scenario (2) it is 4 mJ. What is the energy stored in scenario (3)?



(1)

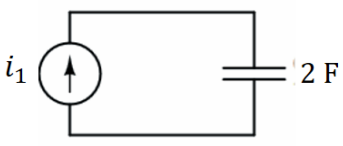


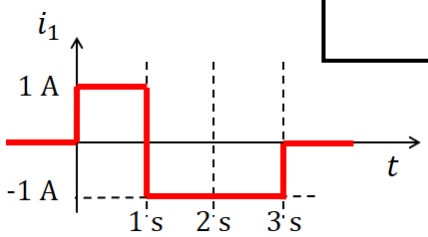
(2)



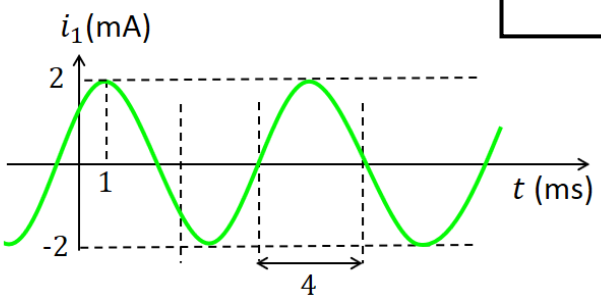
(3)

(e) Assume the capacitor is discharged at time $t = 0$. During what time period(s) does the capacitor receive power? For example, write your answer as $(t < 1\ \text{s})$ and $(1\ \text{s} < t < 2\ \text{s})$.



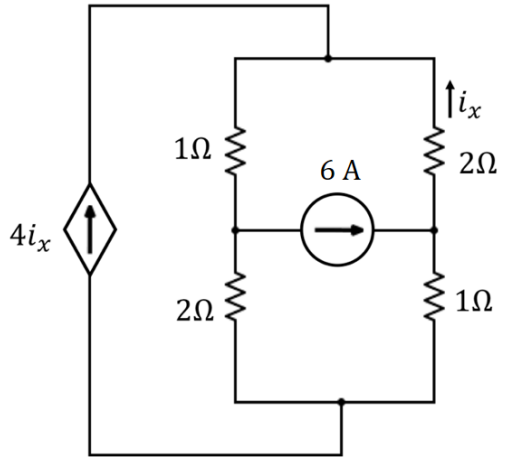


(f) What is the phasor $\mathbf{I_1}$ of this current waveform? Write the phasor in polar coordinates.



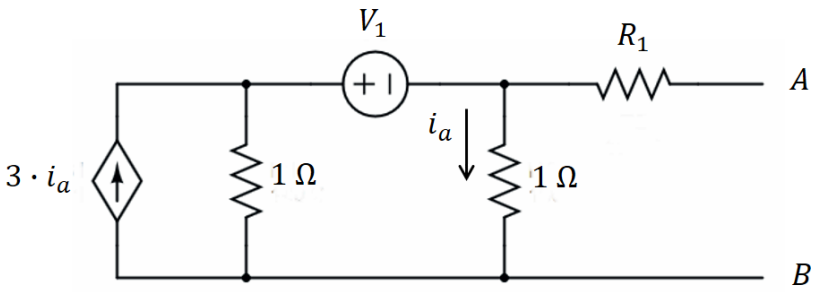
(2) (a) For the circuit below, what is the value of i_x?

(b) What is the power supplied by the dependent source?



(3) (a) For the circuit below, find the Thevenin equivalent model as seen between A and B, when V_1 = 4 V and R_1 = 0 Ω. Draw the model in the answer box with the appropriate values.

(b) What is the Thevenin equivalent resistance when I make the following changes to circuit: V_1 = 8 V and R_1 = 17 Ω?



(4) Consider the circuit below. For $t < 0$, the switch is open and the system has reached steady state. At $t = 0$, the switch closes and it remains closed.

Find $v_C(0^-)$ and $v_C(0^+)$.

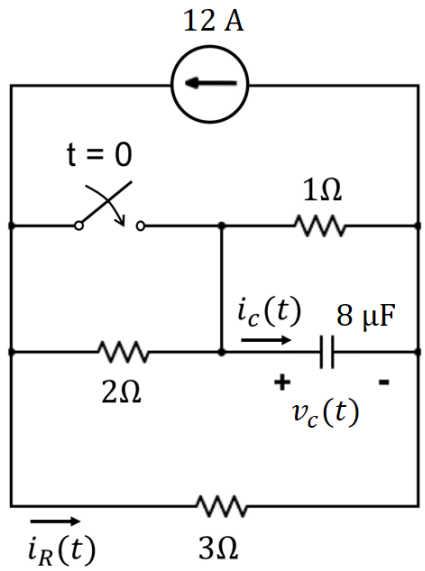
$v_C(0^-)$ $v_C(0^+)$

Find $i_C(0^-)$ and $i_C(0^+)$.

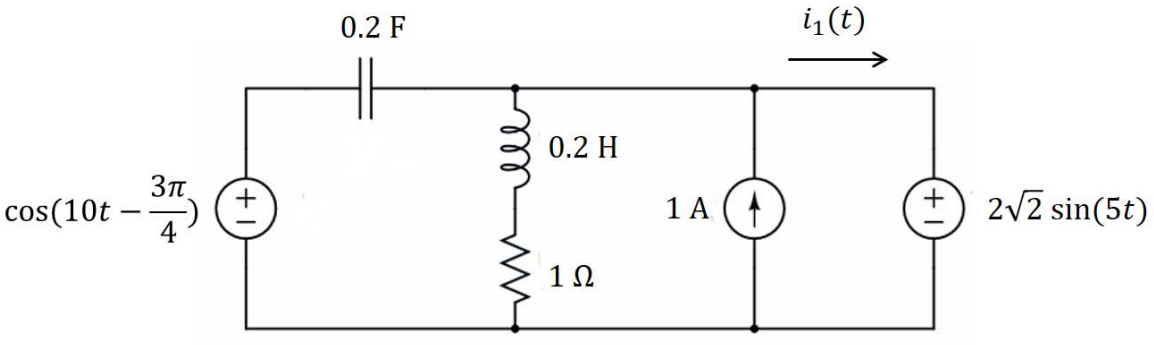
$i_C(0^-)$ $i_C(0^+)$

Find the expression for the current $i_R(t)$ for $t > 0$.

$i_R(t)$ =



(5) For the circuit below, what is i_1(t)? Express your answer in the time domain.



(6) (a) What is the average power received by the inductor?

(b) What is the complex power received by the combination of the resistor and the capacitor?

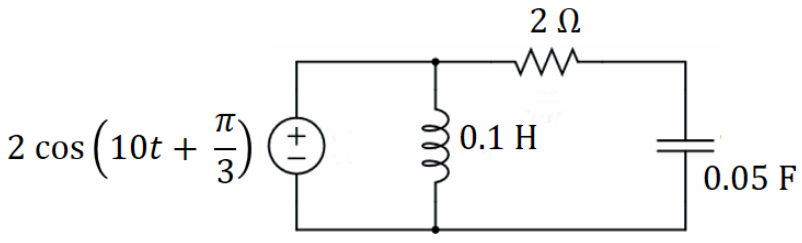
(c) Someone modified the values of the resistor, capacitor and inductor. With these new elements in the circuit (and with the same source), the total complex power received by all elements combined is $S = 1 + j$

What element (resistor, capacitor or inductor) do you need to place in parallel with the source to achieve a total complex power of $S = 1$?

Type of element:

What is the value of that element?

Value of the element:



(7) For the circuit below, what is the expression for v_a(t), for $t > 0$? At $t = 0$, the capacitor voltage is 1 V.