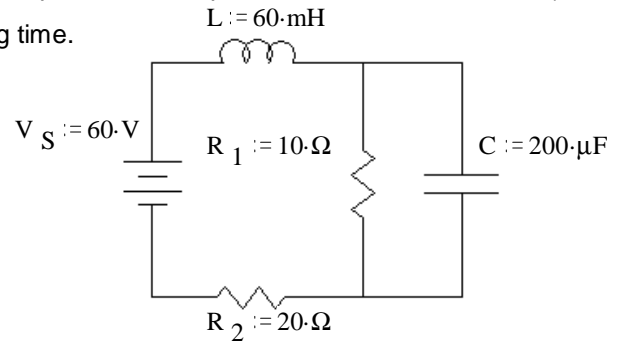


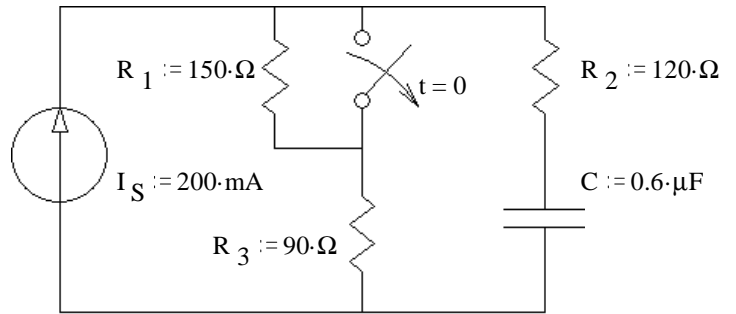
# ECE 2210/00 Exam 2 given: Fall 16

(The space between problems has been removed.)

1. (12 pts) The following circuit has been connected as shown for a long time. Find the energy stored in the capacitor and the inductor. Also show the values of the voltage(s) and current(s) necessary to answer this question.



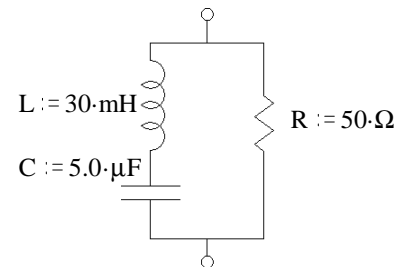
2. (32 pts) The switch has been closed for a long time and is opened (as shown) at time  $t = 0$ .  
 a) Find the initial and final conditions and write the full expression for  $v_C(t)$ , including all the constants that you find.



- b) What is  $v_C$  when  $t = 0.8\tau$ ?  $v_C(0.8\tau) = ?$   
 c) At time  $t = 0.8\tau$  the switch is closed again. Find the complete expression for  $v_C(t')$ , where  $t'$  starts when the switch closes. Be sure to clearly show the time constant.

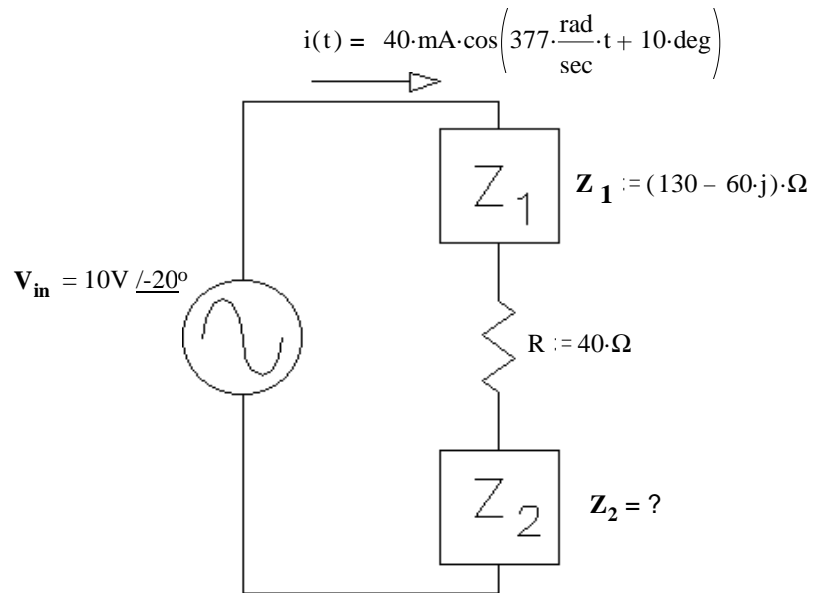
3. (18 pts) Find  $Z_{eq}$  in simple polar form (give me numbers).  
 For partial credit, you must show work and/or intermediate results.

$f = 318.31 \cdot \text{Hz}$



4. (16 pts) For partial credit, you must show work and/or intermediate results.

a) Find  $Z_2$  in polar form



b) Circle 1: i) The source current leads the source voltage  
ii) The source voltage leads the source current

5. (7 pts)

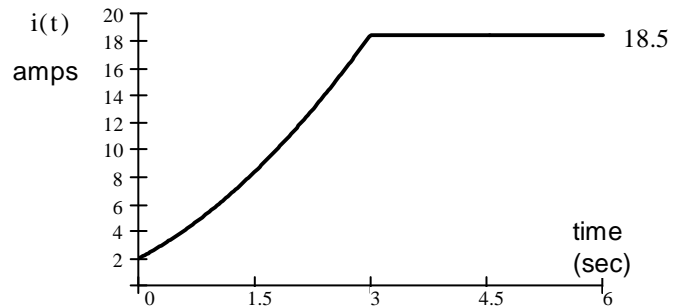


Assume  $Z$  is two components in series. Draw the inside of  $Z$  and find the value of each component.

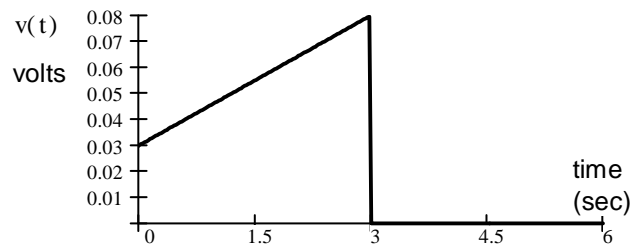
$Z := (100 - j \cdot 80) \cdot \Omega$   
 $\omega := 1000 \cdot \frac{\text{rad}}{\text{sec}}$

6. (15 pts) The current through and the voltage across an unknown component are shown below.

a) What type of component is it? Give a good reason for your choice.



b) What is the value of the component?



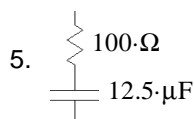
**Answers**

1. 20·V    40·mJ    2·A    120·mJ

3. 31.2 / -51.3° Ω

4. a) 79.9Ω / -54.4°    b) i)

2. a) 48·V - 30·V·e<sup>-t / 216·μs</sup>    b) 34.5·V    c) 18·V + 16.5·V·e<sup>-t' / 126·μs</sup>



6. a) Inductor    b) 10·mH