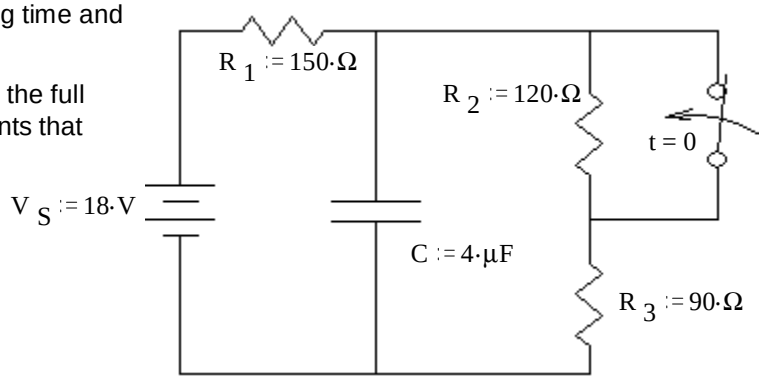
ECE 2210/00 Exam 2 given: Fall 12

(The space between problems has been removed.)

1. (32 pts) a) The switch has been open for a long time and is closed (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.



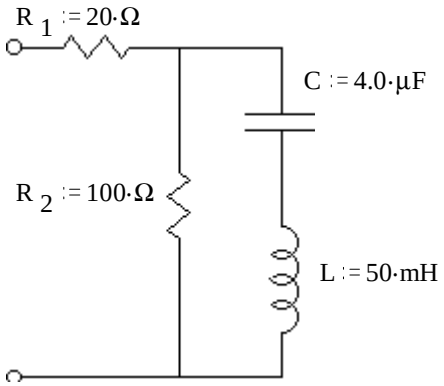
   b) What is v_C when $t = 1.2\tau$? $v_C(1.2\cdot\tau)$ = ?

   c) At time $t = 1.2\tau$ the switch is opened again. Find the complete expression for $v_C(t')$, where t' starts when the switch opens. Be sure to clearly show the time constant.

2. (20 pts) Find $\mathbf{Z_{eq}}$ in simple polar form (give me numbers).

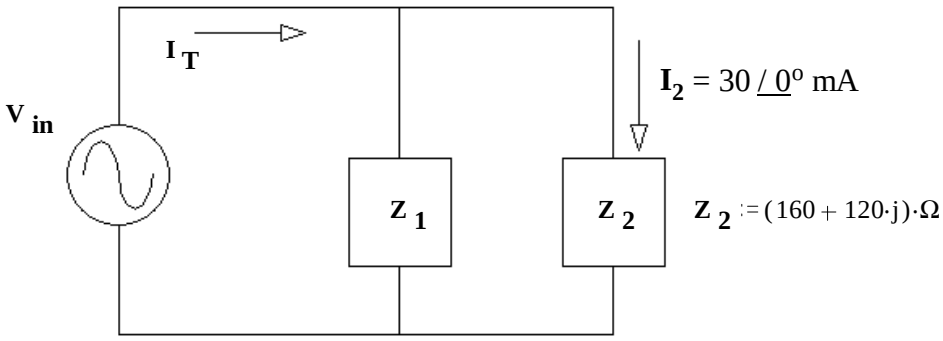
   For partial credit, you must show work and/or intermediate results.

   $f = 159.155$ •Hz



3. (28 pts)

   a) Find $\mathbf{V_{in}}$ in polar form.



   $\mathbf{Z_1} = 100 \angle -32^\circ\ \Omega$

   b) Find $\mathbf{I_T}$.

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

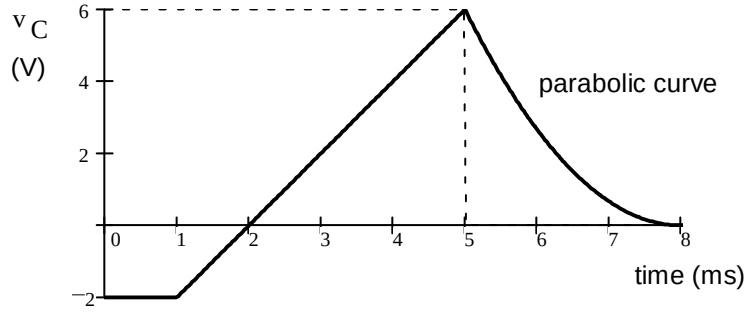
   d) By how much? I.E. what is the phase angle between the voltage and current?

4. 20 pts) The voltage across a capacitor is shown below. Make an accurate drawing of the capacitor current. Make reasonable assumptions where necessary. Label your graph.

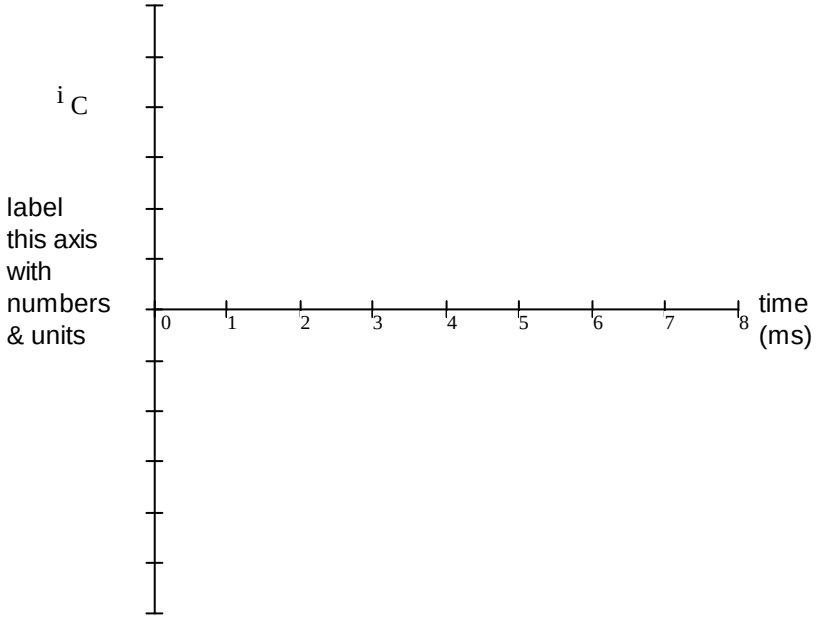
   Note: You will be graded on the accuracy of your plot at $0, 1, 5$ and 8 ms, so calculate those values and plot or label them carefully. Between those points your plot must simply be the correct shape.

   You **MUST SHOW** how you calculate your values starting from the original relationships between voltage and current.

   That is: **Start** with the **interger** and/or **differential** equations for the capacitor!



$C := 1.5 \cdot \mu F$



Answers

1. a) $6.75 \cdot V + 3.75 \cdot V \cdot e^{-\frac{t}{225 \cdot \mu s}}$ b) $7.88 \cdot V$

   c) $10.5 \cdot V - 2.62 \cdot V \cdot e^{-\frac{t'}{350 \cdot \mu s}}$

2. $108\ \Omega$ /-21.8°

3. a) 6 V /36.9° b) 76.1mA /47.3°

c) i) d) $10.4 \cdot deg$

4.