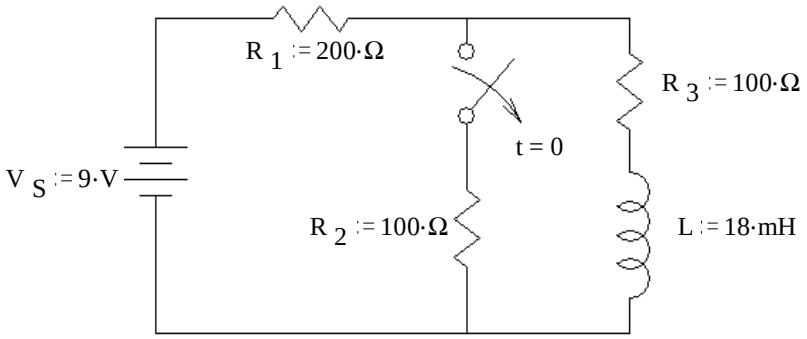
ECE 2210/00 Exam 2 given: Spring 16 (The space between problems has been removed.)

1. (34 pts) The switch has been closed for a long time and is opened (as shown) at time $t = 0$.

   a) Find the complete expression for $i_L(t)$.



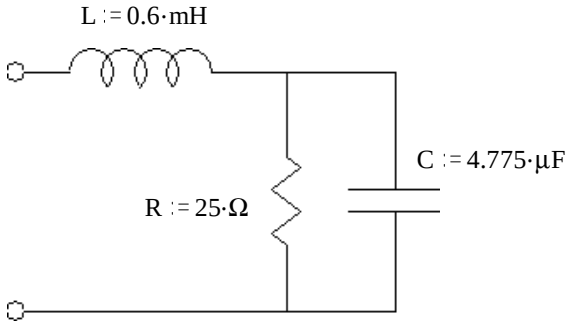
   b) What is i_L when $t = 1.2\tau$? $i_L(1.2\cdot\tau) = ?$

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

2. (18 pts) Find $\mathbf{Z_{eq}}$ in simple polar form (give me numbers).

   You must show work and intermediate results.

   $f := 1000\cdot Hz$

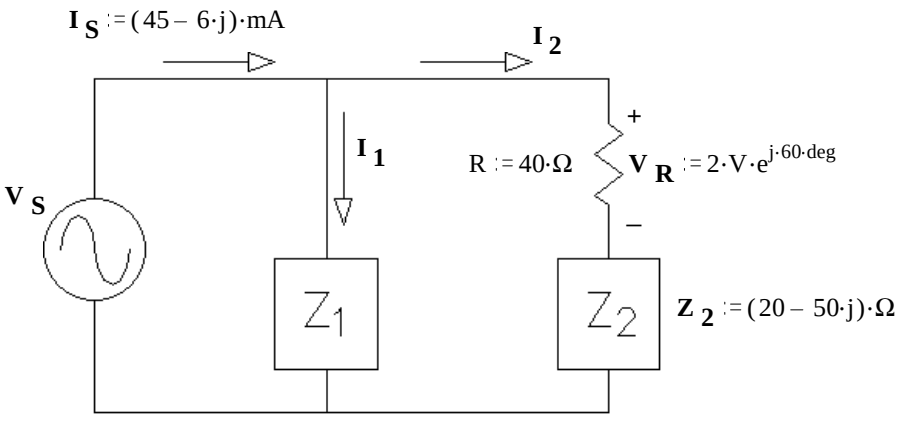


3. (28 pts) For partial credit, you must show work and/or intermediate results.

   a) Find $\mathbf{I_2}$

   b) Find $\mathbf{V_S}$ in polar form.

   c) Find $\mathbf{I_1}$ in polar form.

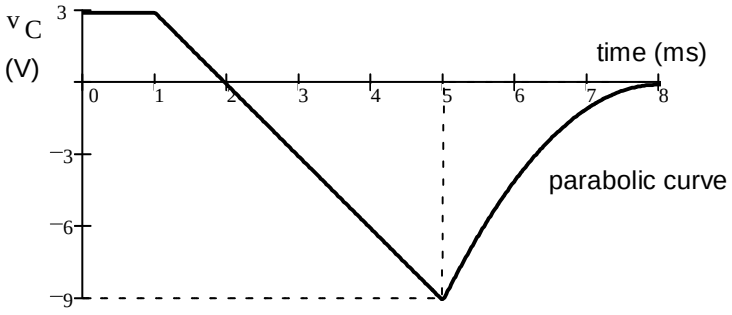


4. 20 pts) The voltage across a capacitor is shown below. Make an accurate drawing of the capacitor current. Make reasonable assumptions where necessary. Label your graph.

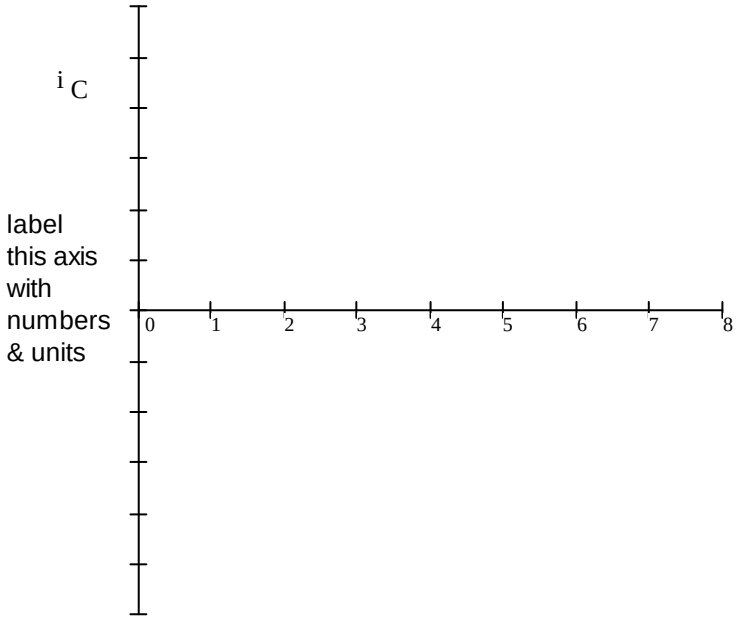
Note: You will be graded on the accuracy of your plot at 0, 1, 5 and 8 ms, so calculate those values and plot or label them carefully. Between those points your plot must simply be the correct shape.

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!



$C := 3 \cdot \mu F$



Answers Folder Number _____

1. a) $30 \cdot mA - 12 \cdot mA \cdot e^{\frac{-t}{60 \cdot \mu s}}$

   b) $26.4 \cdot mA$

   c) $18 \cdot mA + 8.4 \cdot mA \cdot e^{\frac{-t'}{108 \cdot \mu s}}$

2. $18.0\ \Omega\ \underline{/-27.2^o}$

3. a) $50 \cdot mA \cdot e^{j \cdot 60 \cdot deg}$

   c) $53.2 \cdot mA \cdot e^{-j \cdot 67.9 \cdot deg}$

   b) $3.905 \cdot V \cdot e^{j \cdot 20.2 \cdot deg}$

4.