ECE 2300 – CIRCUIT ANALYSIS

HOMEWORK #8

1. The switch in the circuit below was in position a for a long time, and then moved to position b at *t* = 0.

1. Find *iX*(50[ms]).
2. Find *iQ*(50[ms]).



2) For the circuit shown below, switches SW1 and SW2 have been in position a for a long time. At *t* = 0, both switches are moved instantaneously and simultaneously to position b and remain there.

1. Find the power delivered by the *vS2* voltage source, as a function of time, for *t* > 0.
2. Calculate the numerical value of the total energy stored in the capacitors at *t* = 



3) For the circuit shown below, Switch A had been closed for a long time, and Switch B had been open for a long time, before *t* = 0. At *t* = 0, Switch A opened. Then, 100[ms] later, Switch B closed. Find *iX*(200[ms]).



4) For the circuit shown below, the Switch A was open for a long time, and Switch B was closed for a long time, before *t* = 0. At *t* = 0, Switch A was closed. Then, 10[s] later, Switch B was opened. Find *vR*(11[s]).



5) The inductor in the circuit shown below had no energy stored in its magnetic field at *t* = 0.   
At *t* = 100[ns] the switch opened. Find *vX*(200[ns]).



6) For the circuit shown below, the switch had been in position A for a long time.

At *t* = 0 the switch moves to position B, and remains there for 0.1[s].

At *t* = 0.1[s] the switch moves to position C, and remains there.

For the time intervals 0 < *t* < 0.1[s] and *t* > 0.1[s], find the numerical equations for the current *i3(t)*, where *i3* is defined in the circuit shown.



7) In the circuit shown below, all switches have been closed for a long time. Then, at *t* = 0, all switches open, and remain open.

Calculate the total energy stored in the capacitors at *t* = .



8) In the circuit shown below, the switch had been in position a for a long time. At *t* = 0, the switch was moved instantaneously to position b , and stayed there for 0.1[s]. Then, at *t* = 0.1[s], the switch was moved instantaneously back to position a , and remained there.

For the time periods 0 < *t* < 0.1[s] and *t* > 0.1[s], find the numerical expressions for the voltage *vR(t)*, as defined in the circuit.



Numerical Solutions:

1. a) -4.69[mA] ; b) 1.087[mA]

2. a) Solution omitted. b) 25[mJ]

3. -2.70[mA]

4. 1.405[V]

5. 403[V]

6. Solution omitted.

7. 78.4[mJ]

8. Solution omitted.