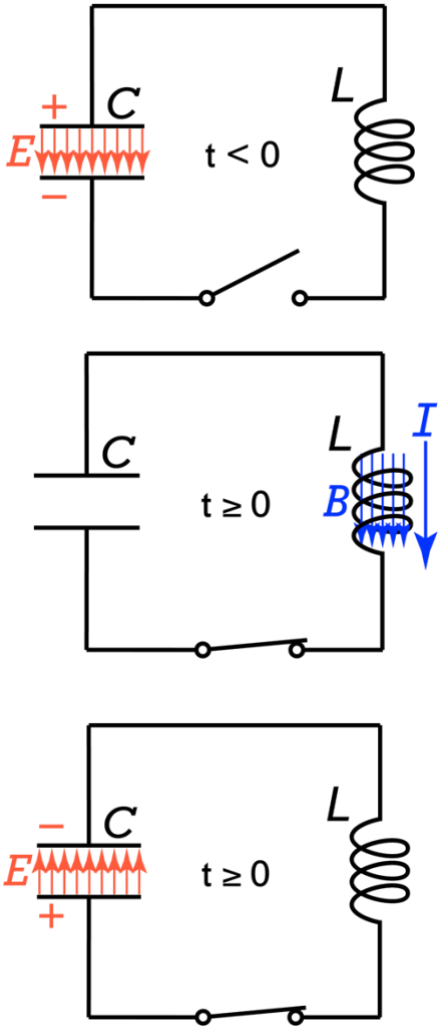
Flipping Physics Lecture Notes:
LC Circuit Basics
http://www.flippingphysics.com/lc-circuit.html



This LC circuit is a circuit with a capacitor, an inductor, and a switch. Before time t = 0, the switch was open for a long time. At time t = 0, the switch is closed and remains closed. A few general things to realize:

- The initial charge on the capacitor must be nonzero, if it were zero, nothing would happen when the switch is closed.
- The initial current in the circuit must be zero because there was no current in the open circuit before the switch was closed.
- The inductor opposes the change in current in the circuit which is why it takes time for the current to change from zero.
- The current through the inductor is from the charges leaving the capacitor to flow through the circuit, therefore, as current through the inductor increases, charge on the capacitor decreases.
- The electric field in the capacitor is decreasing in magnitude and the magnetic field in the inductor is increasing in magnitude.
- Once the charge is completely discharged, q = 0, the inductor has its maximum magnitude magnetic field and the current through the inductor is at its maximum.
- Current will continue to flow and build up charges on the plates of the capacitor, however, the orientation of the positive and negative plates will be reversed, and the current is decreasing.
- Eventually the current through the inductor will reduce to zero and charge will be at a maximum on the plates of the capacitor.
- Repeat the whole cycle in reverse.
- This is *simple harmonic motion!*
    - A horizontal mass-spring system is a good analogous situation.