Prelaboratory #2: Electrical Measurements II

(A) Measuring capacitance
For the two circuits shown:
1. Draw a sketch of the voltage on the capacitor as a function of time assuming that $R_1 = 10 \text{ M} \Omega$.
2. Now assume that $R_1$ is unknown but that you measure the time constant of each circuit, $\tau_1 = R_1 C$ and $\tau_2 = R_2 C$. What is the capacitance $C$?

(D) Passive Low-pass and High-pass Filters
For the two circuits shown, assume that $R = 10 \text{ k}\Omega$, $C = 1 \mu\text{F}$, $L = 1 \mu\text{H}$ and that the voltage source is given by $V = [5\text{volts}] \sin(2\pi[1000\text{Hz}]t)$.

1. What is the current in the circuits as a function of time, $i(t)$?
2. What is the voltage across the resistor as a function of time?