[**Important**: Please try your best to write your derivations clearly and briefly explain the steps. This can help you gain partial credit if you make calculation mistakes.]

Problem 2 [40 pts]

In the circuit in Fig. 1, the switch has been closed for all $t < 0$. At $t = 0$, the switch is opened (and remains open for $t > 0$).

1. [**5 pts**] Find $v(0)$ and $i(0)$.
2. [**15 pts**] Analytically derive the capacitor voltage $v(t)$ for all time instants $t > 0$.
3. [**10 pts**] Intuitively plot the value of $v(t)$ for all time instants $t > 0$. (Remember to indicate the period of oscillation, if any.)
4. [**10 pts**] What is total energy dissipated by the circuit after time $t > 0$?

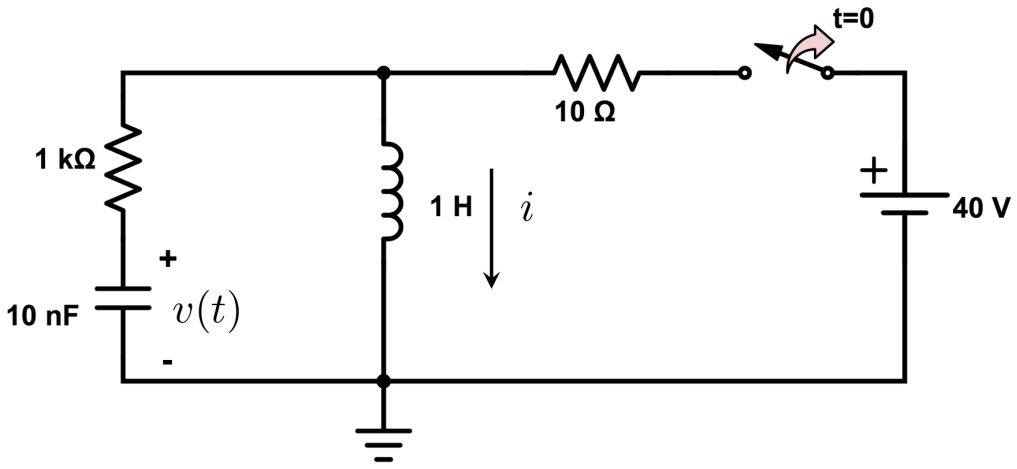

Figure 1