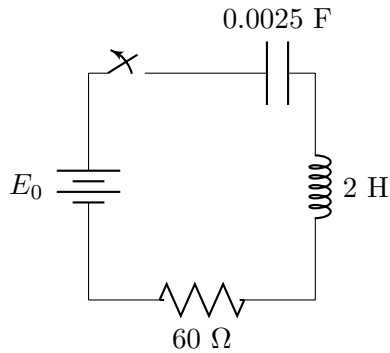


Homework Problems for Sections 3.7 and 3.8

1. Consider an electric circuit with $R = 60\ \Omega$, $L = 2\ H$, and $C = 0.0025\ F$ (see below). Suppose that its input voltage is $E(t) = 100e^{-10t}\ V$. Given the initial current $I(0) = 0$ (in A) and charge $Q(0) = 5$ (in C) on the capacitor, find the current $I(t)$ in the circuit.



2. Consider a mass of $1\ \text{kg}$ in a mass-spring system with spring constant $4\ \text{kg} \cdot \text{s}^{-2}$, damping constant $4\ \text{kg} \cdot \text{s}^{-1}$, and external driving force $F(t) = \cos(2t)$. Assume that the mass is displaced (downwards) $\frac{1}{2}\ \text{m}$ from equilibrium and released. Find the position function of the mass, and graph it.
3. Consider a mass of $1\ \text{kg}$ in an undamped mass-spring system with spring constant $4\ \text{kg} \cdot \text{s}^{-2}$, and external driving force $F(t) = \cos t$. Assume that the mass is displaced (downwards) $\frac{1}{2}\ \text{m}$ from equilibrium and released. Find the position function of the mass, and graph it.