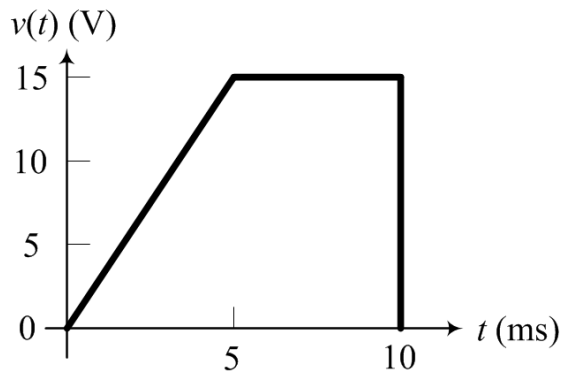


Homework Assignment 3 – AC Circuits

Problem 1 (25 pts) – Capacitors and Inductors

The voltage owing through a component is shown in figure below. **Calculate and plot** the current through the following components:

- Resistor $R = 7 \, \Omega$ (5 pts)
- Capacitor $C = 0.5 \, \mu\text{F}$ (10 pts)
- Inductor $L = 7 \, \text{mH}$ (10 pts).



Problem 2 (25 pts) – Guessing Game

If the **current** through and the **voltage** across a component in an electric circuit are

$$i(t) = 17 \cos(\omega t - \pi/12) \, \text{mA}$$

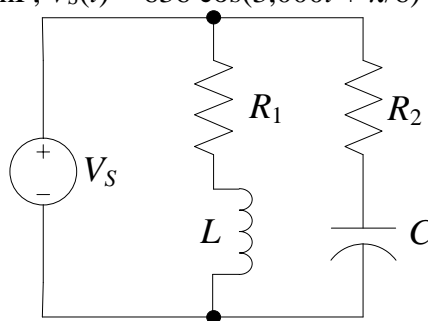
$$v(t) = 3.5 \cos(\omega t + 1.309) \, \text{V}$$

where $\omega = 628.3 \, \text{rad/s}$, determine

- Is the component a resistor, capacitor, **or** inductor? (15 pts)
- Find the corresponding value of the component (in ohms, farads, or henrys) (10 pts)

Problem 3 (25 pts) – Impedance 1

Determine the **equivalent impedance** in the circuit below. The values are $R_1 = 2.3 \, \text{k}\Omega$, $R_2 = 1.1 \, \text{k}\Omega$, $L = 190 \, \text{mH}$, $C = 55 \, \text{nF}$, $V_S(t) = 636 \cdot \cos(3,000t + \pi/6) \, \text{V}$.



Problem 4 (25 pts) – Impedance 2

Find the **equivalent impedance** Z_{EQ} of the circuit shown below assuming $\omega = 6 \cdot 10^6$ rad/s.

