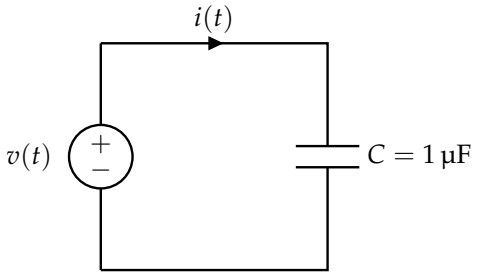
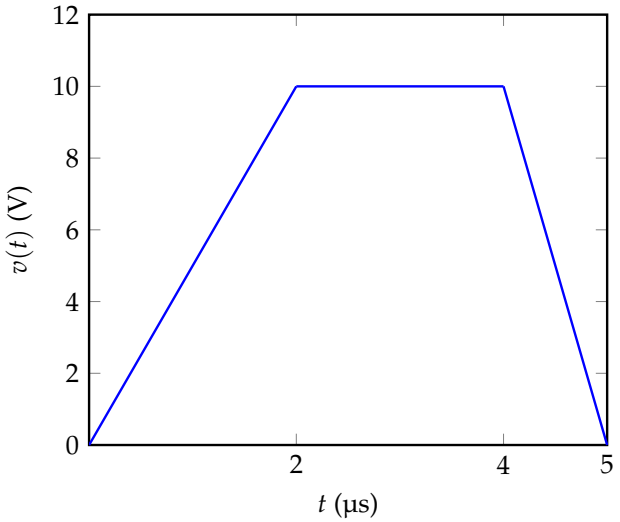
Discussion 1A

1. Determining Current for a Capacitance Given Voltage (Hambley Example 3.1)

Supposed that the voltage $v(t)$ shown in Figure 1b is applied to a 1 µF capacitance.



(a) Example Circuit



(b) Plot of $v(t)$

Figure 1

Plot the stored charge ($q(t)$) and the current ($i(t)$) through the capacitor versus time.

2. Determining Voltage for a Capacitance Given Current (Hambley Example 3.2)

After t_0 the current in a 0.1 µF capacitor is given by

$$i(t) = 0.5 \sin 10^4 t \tag{1}$$

(The argument of the sin function is in radians.) The initial charge on the capacitor is $q(0) = 0$.

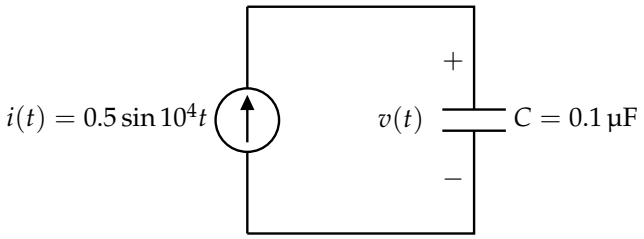


Figure 2: Example Circuit

Plot $i(t)$, $q(t)$, and $v(t)$ to scale versus time.

3. Current, Power, and Energy for a Capacitance (Hambley Example 3.3)

Suppose that the voltage waveform shown in Figure 3 is applied to a 10-μF capacitance.

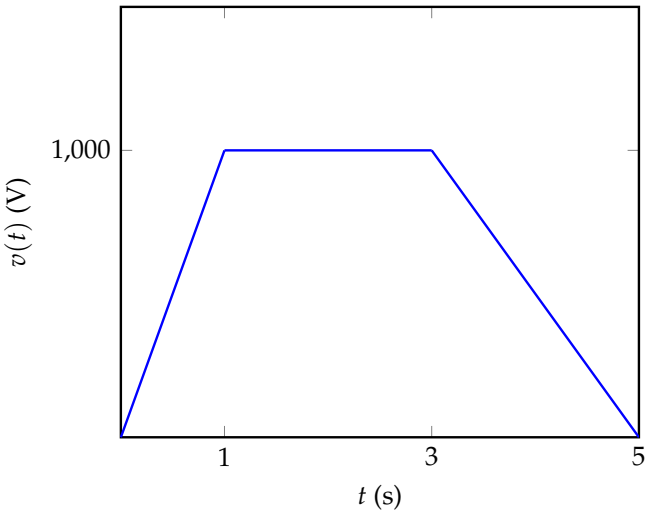


Figure 3: Plot of $v(t)$

Find and plot the current, the power delivered, and the energy stored for time between 0 and 5 s.