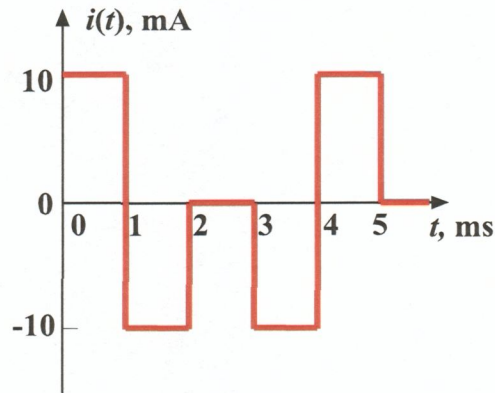# Problem #08

The waveform for the current in a $1000\,\mu F$ initially uncharged capacitor is shown. Determine and accurately sketch the waveform for the capacitor's voltage.

$$v(t) = v(0) + \frac{1}{C}\int_0^t i(t)\,dt$$

$$= 0 + 10^3 \int_0^t i(t)\,dt$$

$$= \begin{cases} 0 : & t=0 \\[4pt] 0 + 10^3 \int_0^t (10\times10^{-3})\,dt = 10t \ V : & 0 < t < 1ms \\[4pt] 0.01 + 10^3 \int_{1ms}^t (-10\times10^{-3})\,dt = 0.02 - 10t \ V : & 1ms < t < 2ms \\[4pt] 0 : & 2ms < t < 3ms \\[4pt] 0 + 10^{-3} \int_{3ms}^t (-10\times10^{-3})\,dt = 0.03 - 10t \ V : & 3ms < t < 4ms \\[4pt] -0.01 + 10^3 \int_{4ms}^t (10\times10^{-3})\,dt = -0.05 + 10t \ V : & 4ms < t < 5ms \\[4pt] 0 : & 5ms < t \end{cases}$$