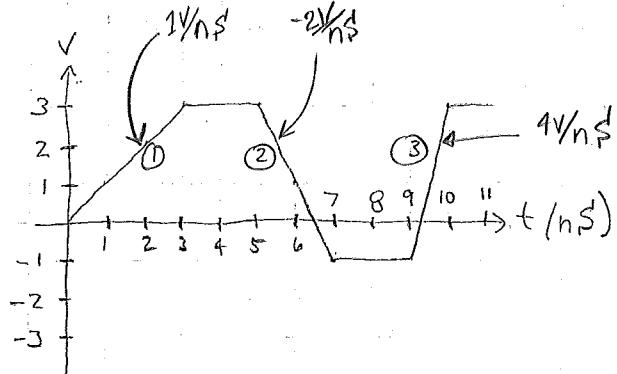


10. A  $1\text{nF}$  capacitor has the following voltage waveform across its terminals. Sketch the corresponding current waveform.



$$\begin{aligned} \textcircled{1} \quad I_c &= C \frac{dv}{dt} \\ &= 1 \times 10^{-9} \text{ F} \cdot \frac{1\text{V}}{1\text{ns}} \\ &= 1 \times 10^{-9} \frac{\text{C}}{\text{s}} \cdot \frac{1\text{V}}{1 \times 10^{-9}\text{s}} \\ &= 1\text{A} \quad (\text{region 1}) \end{aligned}$$

$$\begin{aligned} \textcircled{2} \quad I_c &= 1 \times 10^{-9} \text{ F} \cdot \frac{-2\text{V}}{1\text{ns}} \\ &= 1 \times 10^{-9} \frac{\text{C}}{\text{s}} \cdot \frac{-2\text{V}}{1 \times 10^{-9}\text{s}} \\ &= -2\text{A} \quad (\text{region 2}) \end{aligned}$$

$$\begin{aligned} \textcircled{3} \quad I_c &\text{ will be } 2 \times \textcircled{2} + \text{positive} \\ I_c &= 4\text{A} \quad (\text{region 3}) \end{aligned}$$

