

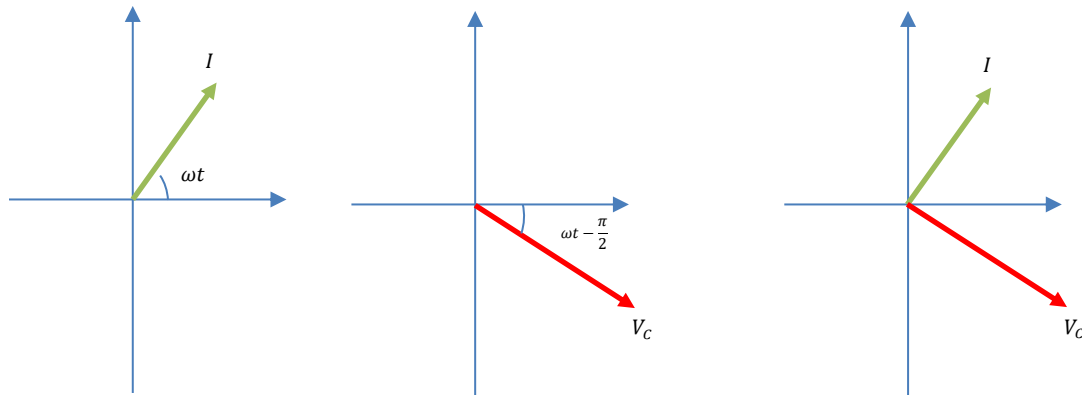
## CONCEPT: PHASORS FOR CAPACITORS

- Remember! The voltage and current across a capacitor at any time  $t$  is

$$- i(t) = i_{MAX} \cos(\omega t)$$

$$- v_c(t) = i_{MAX} X_C \cos\left(\omega t - \frac{\pi}{2}\right)$$

- Because both cosines have a DIFFERENT angle, they are said to be OUT OF PHASE – The voltage LAGS the current
  - This is reflected in their phasors:



- Voltage across a capacitor LAGS the current

EXAMPLE: An AC source is connected to a capacitor. At a particular instant in time, the voltage across the capacitor is positive and increasing in magnitude. Draw the phasors for voltage and current that correspond to this time.

### **PRACTICE: PHASORS IN A CAPACITOR CIRCUIT**

An AC source operates at a maximum voltage of 60 V and is connected to a 0.7 mF capacitor. If the current across the capacitor is  $i(t) = i_{MAX} \cos[(100 \text{ s}^{-1})t]$ ,

- a) What is  $i_{MAX}$ ?
- b) Draw the phasors for voltage across the capacitor and current in the circuit at  $t = 0.02 \text{ s}$ . Assume that the current phasor begins at  $0^\circ$ .