

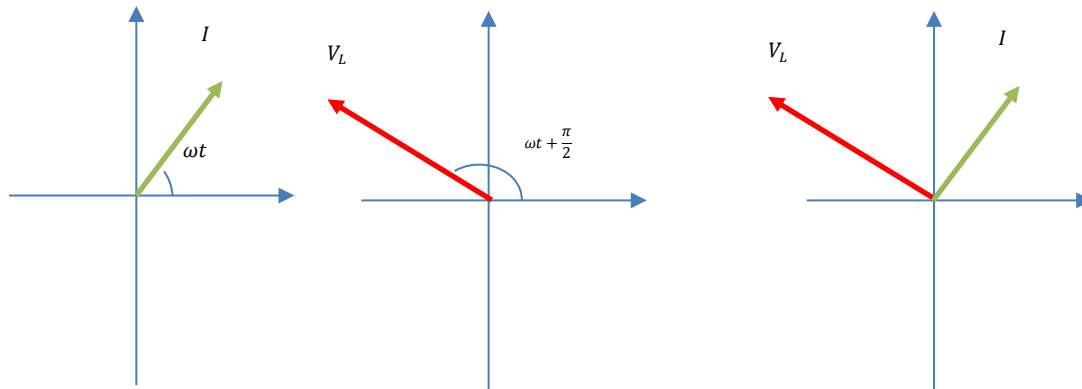
CONCEPT: PHASORS FOR INDUCTORS

- Remember! The voltage and current across an inductor at any time t is

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

$$- v_L(t) = i_{MAX} X_L \cos\left(\omega t + \frac{\pi}{2}\right)$$

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



- Voltage across an inductor LEADS the current

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

PRACTICE: PHASORS IN A INDUCTOR CIRCUIT

An AC source operates at a maximum voltage of 75 V and is connected to a 0.4 H inductor. If the current across the inductor is $i(t) = i_{MAX} \cos[(450 \text{ s}^{-1})t]$,

- a) What is i_{MAX} ?
- b) Draw the phasors for voltage across the inductor and current in the circuit at $t = 4.2 \text{ ms}$. Assume that the current phasor begins at 0° .