$$v_R(t) = \frac{\omega RC}{\sqrt{(1-\omega^2 LC)^2 + (\omega RC)^2}} V_0 \cos\left(\omega t + \tan^{-1}\left(\frac{1-\omega^2 LC}{\omega RC}\right)\right)$$

Let's take a look at generalized Ohm's Law for a moment:

$$\tilde{V} = \tilde{Z}\tilde{I} = Z\angle\phi\,\tilde{I}$$

$$\cancel{V\angle\theta = (Z\angle\phi)(I\angle\theta)}$$

$$V\angle\theta = (Z\angle\phi)(I\angle\gamma)$$

$$= ZI\angle(\phi+\gamma)$$

Assume $\theta = 0°$ (the time reference)

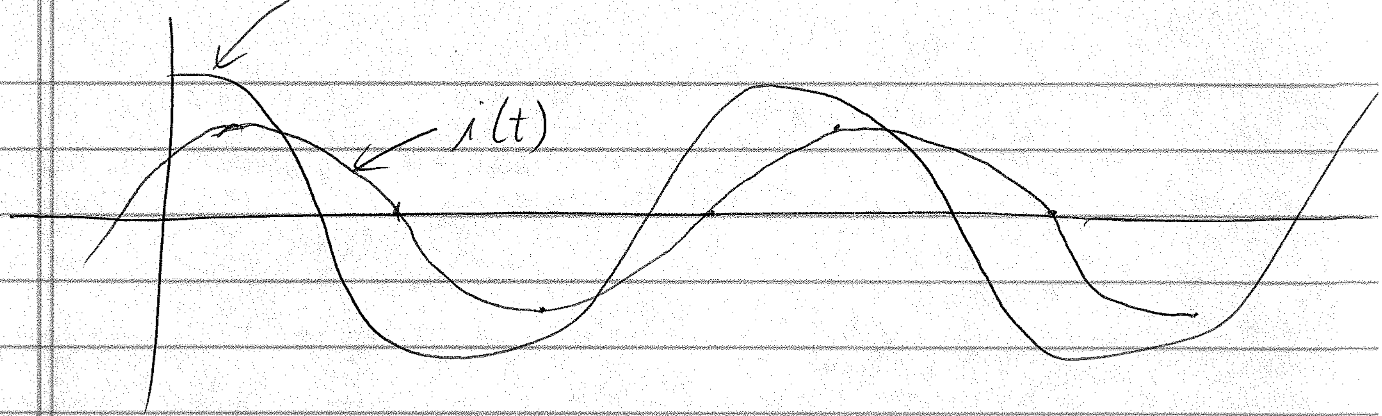
$$V\angle 0° = ZI\angle(\phi+\gamma)$$

$$\text{or} \quad \phi + \gamma = 0°$$
$$\gamma = -\phi$$

$v(t) = V\cos(\omega t + 0°)$ $\qquad$ $i(t) = I\cos(\omega t + \gamma)$
$\qquad\qquad\qquad\qquad\qquad\qquad = I\cos(\omega t - \phi)$

If $\phi > 0$ (inductive) then what do these look like? $\quad$ To make $(\omega t - \phi) = 0$, we need $\omega t = \phi$

$$t = \frac{\phi}{\omega} > 0$$



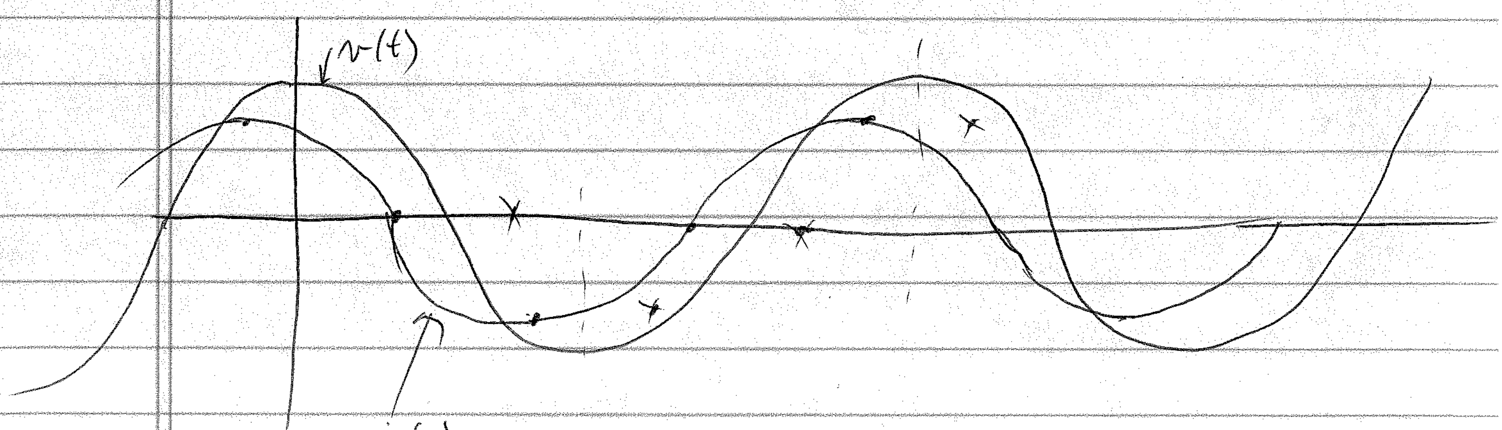
V comes before I in an inductive ckt.

We say i lags v.

Use E instead of V → E L I ← L for inductor.

If $\phi < 0$, then $t = \frac{\phi}{\omega} < 0$, so:

capacitive ckt.



C for capacitor

ICE

We say i leads v