Lecture 22

From section 8.3 and 8.4

Solve E8.3, E8.4-E8.7, 8.5, 8.6, 8.7

Phasors

* phasors are the complex response function without the $e^{j\omega t}$ part

$$v(t) = A_v \cos(\omega t + \theta_v)$$

$$\Downarrow$$

$$v(t) = \text{real}\left(A_v e^{j(\omega t + \theta_v)}\right)$$

$$\Downarrow$$

$$v(t) = \text{real}\left(\underbrace{A_v e^{j\theta_v}}_{V} e^{j\omega t}\right)$$

Phasors (Cont'd)

* $v(t) = \text{real}\left(\tilde{V} e^{j\omega t}\right)$
* the phasor $\tilde{V}$ contains all the information about amplitude and phase of the signal

* phasors transform differential equations to Algebraic equations.

Example

Find the phasors equivalent to the following signals:

$$v_1(t) = 30\cos(120\pi t + 120^\circ)$$

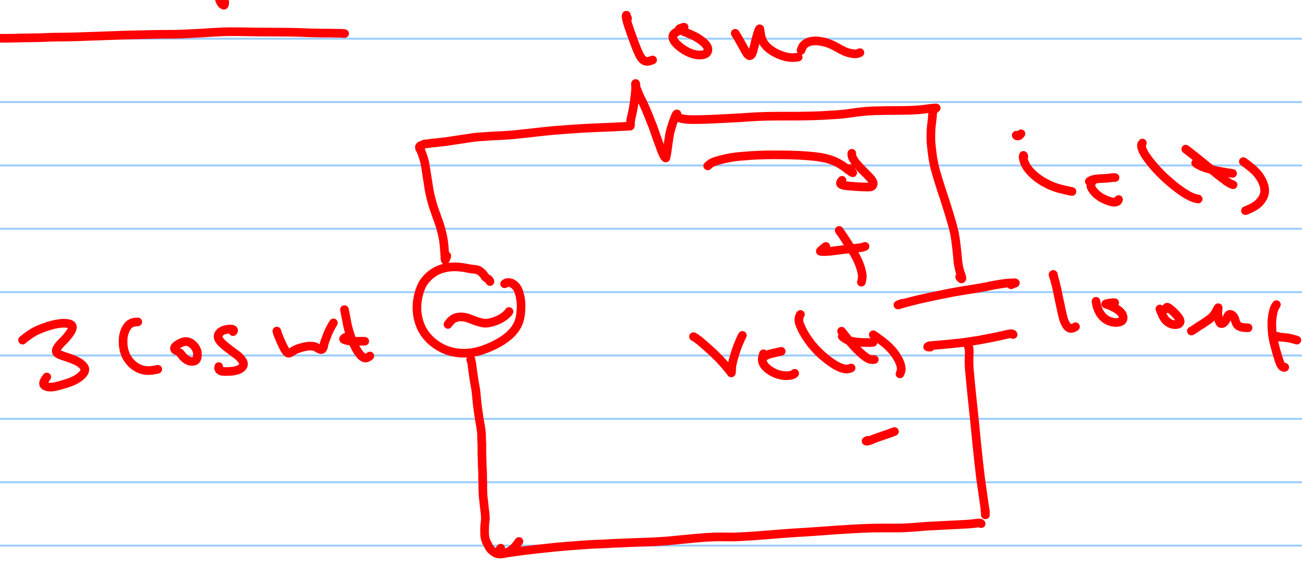
$$v_2(t) = 10\sin(60\pi t - 45^\circ)$$

$$i_1(t) = 0.1\sin\left(180\pi t + \frac{2\pi}{3}\right)$$

Example

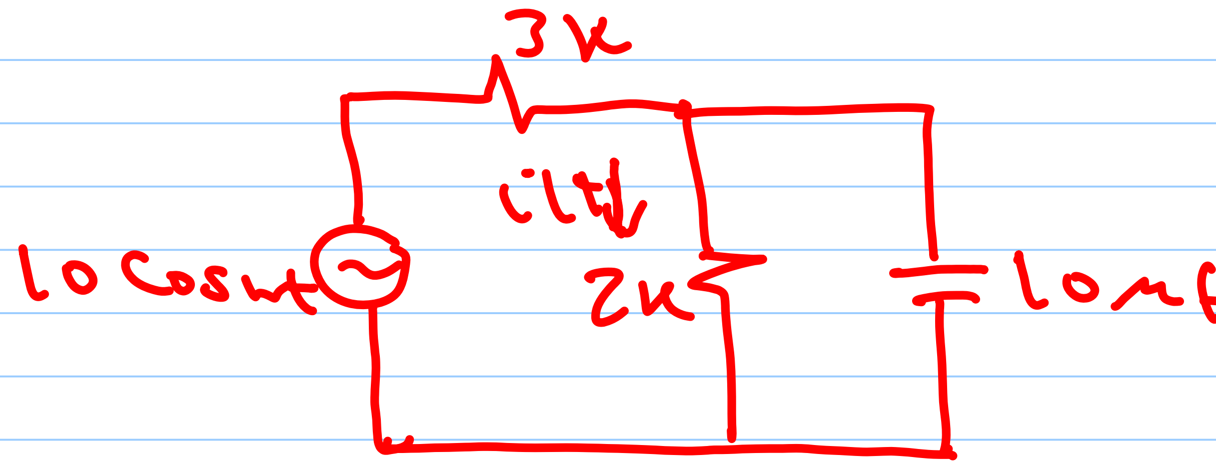
The pharor of the current through a capacitor is $0.01 \angle -30^\circ$. If the frequency is 100 Hz, find $i(t)$.

Example



Use phasor analysis to find $v_c(t)$ and $i_c(t)$

Example



Utilize phasor analysis to find $i(t)$