

P 9.1 [a] $\omega = 2\pi f = 3769.91 \text{ rad/s}$, $f = \frac{\omega}{2\pi} = 600 \text{ Hz}$

[b] $T = 1/f = 1.67 \text{ ms}$

[c] $V_m = 10 \text{ V}$

[d] $v(0) = 10 \cos(-53.13^\circ) = 6 \text{ V}$

[e] $\phi = -53.13^\circ$; $\phi = \frac{-53.13^\circ(2\pi)}{360^\circ} = -0.9273 \text{ rad}$

[f] $V = 0$ when $3769.91t - 53.13^\circ = 90^\circ$. Now resolve the units:

$$(3769.91 \text{ rad/s})t = \frac{143.13^\circ}{(180^\circ/\pi)} = 2.498 \text{ rad}, \quad t = 662.64 \mu\text{s}$$

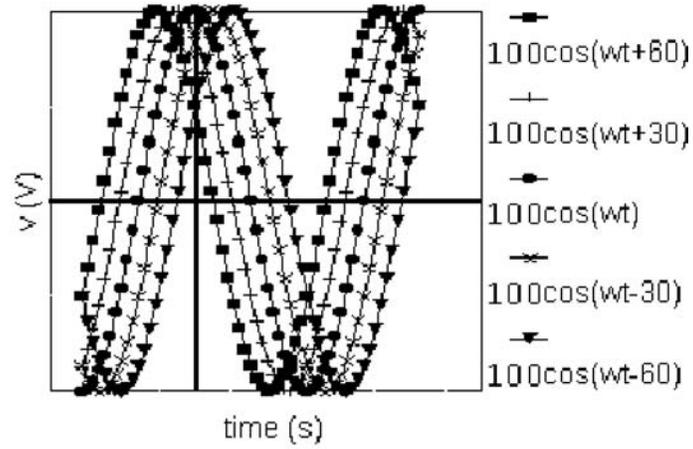
[g] $(dv/dt) = (-10)3769.91 \sin(3769.91t - 53.13^\circ)$

$$(dv/dt) = 0 \quad \text{when} \quad 3769.91t - 53.13^\circ = 0^\circ$$

$$\text{or} \quad 3769.91t = \frac{53.13^\circ}{57.3^\circ/\text{rad}} = 0.9273 \text{ rad}$$

Therefore $t = 245.97 \mu\text{s}$

P 9.4



[a] Left as ϕ becomes more positive

[b] Left

P 9.6 [a] $\frac{T}{2} = 8 + 2 = 10 \text{ ms}; \quad T = 20 \text{ ms}$

$$f = \frac{1}{T} = \frac{1}{20 \times 10^{-3}} = 50 \text{ Hz}$$

[b] $v = V_m \sin(\omega t + \theta)$

$$\omega = 2\pi f = 100\pi \text{ rad/s}$$

$$100\pi(-2 \times 10^{-3}) + \theta = 0; \quad \therefore \theta = \frac{\pi}{5} \text{ rad} = 36^\circ$$

$$v = V_m \sin[100\pi t + 36^\circ]$$

$$80.9 = V_m \sin 36^\circ; \quad V_m = 137.64 \text{ V}$$

$$v = 137.64 \sin[100\pi t + 36^\circ] = 137.64 \cos[100\pi t - 54^\circ] \text{ V}$$

P 9.11 [a] $\mathbf{Y} = 50/60^\circ + 100/_{-}30^\circ = 111.8/_{-}3.43^\circ$

$$y = 111.8 \cos(500t - 3.43^\circ)$$

[b] $\mathbf{Y} = 200/50^\circ - 100/60^\circ = 102.99/40.29^\circ$

$$y = 102.99 \cos(377t + 40.29^\circ)$$

[c] $\mathbf{Y} = 80/30^\circ - 100/_{-}225^\circ + 50/_{-}90^\circ = 161.59/_{-}29.96^\circ$

$$y = 161.59 \cos(100t - 29.96^\circ)$$

[d] $\mathbf{Y} = 250/0^\circ + 250/120^\circ + 250/_{-}120^\circ = 0$

$$y = 0$$

P 9.12 [a] 1000Hz

[b] $\theta_v = 0^\circ$

[c] $\mathbf{I} = \frac{200/0^\circ}{j\omega L} = \frac{200}{\omega L} / -90^\circ = 25 / -90^\circ; \quad \theta_i = -90^\circ$

[d] $\frac{200}{\omega L} = 25; \quad \omega L = \frac{200}{25} = 8 \Omega$

[e] $L = \frac{8}{2\pi(1000)} = 1.27 \text{ mH}$

[f] $Z_L = j\omega L = j8 \Omega$