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

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

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

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

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

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

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

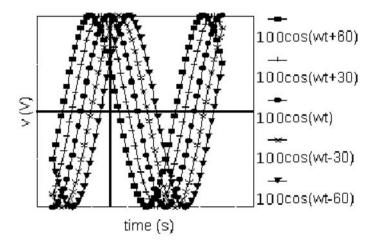
[g]
$$(dv/dt) = (-10)3769.91 \sin(3769.91t - 53.13^{\circ})$$

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

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

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

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- [a] Left as ϕ becomes more positive
- [b] Left

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

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

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

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

$$100\pi(-2\times10^{-3}) + \theta = 0;$$
 $\therefore \theta = \frac{\pi}{5} \text{ rad} = 36^{\circ}$

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

$$80.9 = V_m \sin 36^\circ; \qquad V_m = 137.64 \,\mathrm{V}$$

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

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

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

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

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

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

 $y = 0$

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P 9.12 [a] 1000Hz

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

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

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

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

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