Exercises
Chapter 12.1

1. $i(t) = 2\cos(100t) \Rightarrow \underline{I} = 2\angle 0^\circ$

$v(t) = 120\cos(100t + 65^\circ) \Rightarrow \underline{V} = 120\angle 65^\circ$

$$P = \frac{V_m I_m}{2}\cos(\theta_v - \theta_i)$$

$$= \frac{(120)(2)}{2}\cos(65^\circ - 0^\circ)$$

$$= \underline{\underline{50.7\ W}}$$

Exercises
Chapter 12.2

1. $i(t) = 2\cos(100t)$

$v(t) = 120\cos(100t + 65°)$

$$P = \frac{V_m I_m}{2}\cos(\theta_v - \theta_i) = \frac{(120)(2)}{2}\cos(65° - 0°)$$

$$\underline{\underline{P = 50.7\ W}}$$

$$Q = \frac{V_m I_m}{2}\sin(\theta_v - \theta_i) = \frac{(120)(2)}{2}\sin(65° - 0°)$$

$$\underline{\underline{Q = 108.76\ VAR}}$$

Exercises

Chapter 12.3

1. $i(t) = 2\cos(100t)$

$$I_{RMS} = \frac{2}{\sqrt{2}}$$

$v(t) = 120\cos(100t + 65°)$

$$V_{RMS} = \frac{120}{\sqrt{2}}$$

Exercises
Chapter 12.4

1. $v(t) = 120 \cos(100t + 65°)$

$i(t) = 2 \cos(100t)$

$$\text{Apparent power} = \frac{(120)(2)}{2} = \underline{\underline{120 \text{ VA}}}$$

$$pf = \cos(\theta_v - \theta_i) = \cos(65° - 0°) = \underline{\underline{0.42}}$$

2. $P = V_{RMS} I_{RMS} \cos(\theta_v - \theta_i)$

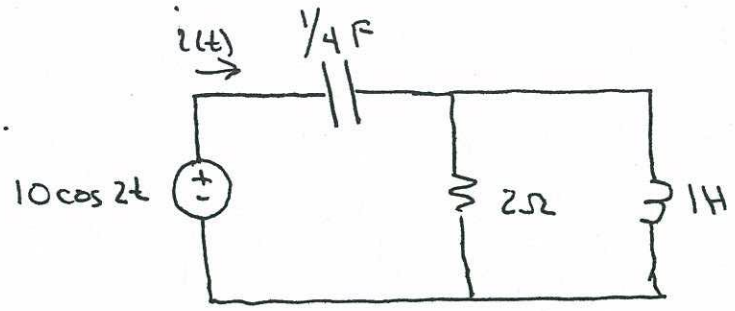
$$100{,}000 \text{ W} = V_{RMS} (256 \text{ A})(0.85)$$

$$V_{RMS} = \frac{100{,}000 \text{ W}}{(256 \text{ A})(0.85)} = \underline{\underline{460 \text{ V}}}$$

3. $\theta = \cos^{-1}(0.9) = \underline{\underline{25.8°}}$

Exercises
Chapter 12.5

2.



Impedance domain circuit

(a)

$$\underline{I} = \frac{10\angle 0^\circ}{1-j} = \frac{10\angle 0^\circ}{\sqrt{2}\angle -45^\circ} = \frac{10}{\sqrt{2}}\angle 45^\circ$$

$$i(t) = \frac{10}{\sqrt{2}}\cos(2t + 45^\circ)$$

(b) $$S = \frac{V I^*}{2} = \frac{(10\angle 0^\circ)\left(\frac{10}{\sqrt{2}}\angle -45^\circ\right)}{2}$$

$$S = \frac{50}{\sqrt{2}}\angle -45^\circ \text{ VA}$$

Note: complex conjugate changes sign on phase angle

(c) $$P = \frac{VI}{2}\cos(\theta_v - \theta_i)$$

$$= \frac{(10)\left(10/\sqrt{2}\right)}{2}\cos(-45^\circ)$$

$$P = 25 \text{ W}$$