2-10 Problems

P-2.1 Define $x(t)$ as

$$x(t) = 3\cos(\omega_0 t - \pi/4)$$

For $\omega_0 = \pi/5$, make a plot of $x(t)$ that is valid over the range $-10 \leq t \leq 20$.

P-2.2 Figure P-2.2 is a plot of a sinusoidal wave. From the plot, determine values for the amplitude (A), phase (ϕ), and frequency (ω_0) needed in the representation:

$$x(t) = A\cos(\omega_0 t + \phi)$$

Give the answer as numerical values, *including the units* where applicable.

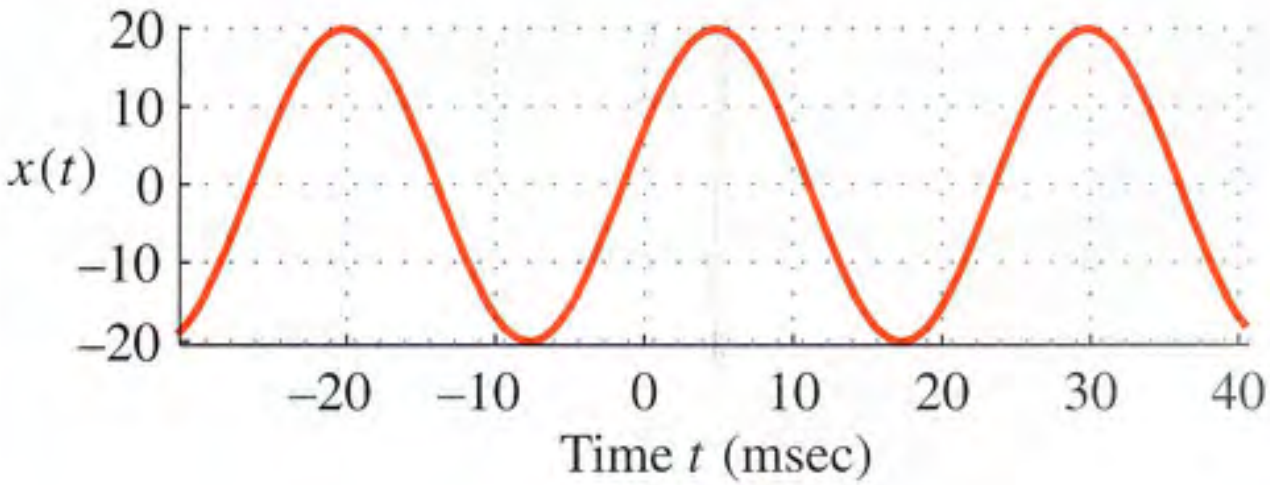

Figure P-2.2

P-2.7 Simplify the following expressions:

(a) $3e^{j\pi/3} + 4e^{-j\pi/6}$

(b) $(\sqrt{3} - j3)^{10}$

(c) $(\sqrt{3} - j3)^{-1}$

(d) $(\sqrt{3} - j3)^{1/3}$

(e) $\Re e\left\{je^{-j\pi/3}\right\}$

Give the answers in *both* Cartesian form $(x + jy)$ and polar form $(re^{j\theta})$.

P-A.6 Simplify the following complex-valued sum:

$$z = e^{j9\pi/3} + e^{-j5\pi/8} + e^{j13\pi/8}$$

Give the numerical answer for z in polar form. Draw a vector diagram for the three vectors and their sum (z).

P-A.8 Solve the following equation for z:

$$z^4 = j$$

Be sure to find all possible answers, and express your answer(s) in polar form.