



PROBLEM:

Convert the following to rectangular form:

(a) $z = 3\sqrt{2} e^{-j(3\pi/4)}$

(b) $z = 5e^{j(\pi/2)}$

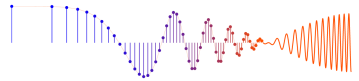
(c) $z = 4 \angle (\pi/3)$

(d) $z = 5 \angle (-61\pi)$

Give numerical values for the real and imaginary parts.

McClellan, Schafer and Yoder, *Signal Processing First*, ISBN 0-13-065562-7.
Prentice Hall, Upper Saddle River, NJ 07458. © 2003 Pearson Education, Inc.

SOLUTION



$$(a) \quad z = 3\sqrt{2} e^{-j\frac{3\pi}{4}} = 3\sqrt{2} \left(\cos\left(-\frac{3\pi}{4}\right) + j \sin\left(-\frac{3\pi}{4}\right) \right)$$

$$z = 3\sqrt{2} \left(-\frac{\sqrt{2}}{2} + j \left(-\frac{\sqrt{2}}{2} \right) \right) = -3 - j3$$

$$(b) \quad z = 5 e^{j\frac{\pi}{2}} = 0 + j5$$

$$(c) \quad z = 4 \angle \frac{\pi}{3} = 4 \left(\cos \frac{\pi}{3} + j \sin \frac{\pi}{3} \right)$$

$$z = 4 \left(0.5 + j \frac{\sqrt{3}}{2} \right) = 2 + j2\sqrt{3}$$

$$(d) \quad z = 5 \angle -61\pi = 5 \left(\cos(-61\pi) + j \sin(-61\pi) \right)$$
$$-61\pi = \pi$$

$$z = -5 + j0$$