



PROBLEM:

Convert the following to polar form:

(a) $z = 0 - j3$

(c) $z = 3 - j4$

(b) $z = (1, -1)$

(d) $z = (0, 4)$

Convert the following to rectangular form:

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

(g) $z = 7e^{j(3\pi/2)}$

(f) $z = 1.6 \angle (\pi/3)$

(h) $z = 3 \angle (11\pi)$



(a) $z = 0 - j3$
 $= 3e^{-j\pi/2}$

Im
Re
ANGLE = $-90^\circ = -\pi/2$ rads.

(b) $z = (1, -1)$
 $= 1 - j = \sqrt{2}e^{-j\pi/4}$

Im
Re
 $\theta = -45^\circ = -\pi/4$ rads

(c) $z = 3 - j4$
 $= 5e^{-j0.295\pi}$

Im
Re
Length = $\sqrt{3^2 + 4^2} = \sqrt{25} = 5$
 $\theta = -\tan^{-1}(4/3) = -53.1^\circ = -0.295\pi$ rads

(d) $z = (0, 4) = 4j$
 $= 4e^{j\pi/2}$

Im
Re
 $90^\circ = \pi/2$ rads

(e) $z = \sqrt{2}e^{-j3\pi/4} = \sqrt{2}\cos(-\frac{3\pi}{4}) + j\sqrt{2}\sin(-\frac{3\pi}{4})$
 $\boxed{z = -1 - j} = \sqrt{2}(-.707...) + j\sqrt{2}(-.707...)$

Im
Re
 $\angle = -\frac{3\pi}{4}$

(f) $z = 1.6 \angle \pi/3 = 1.6e^{j\pi/3}$
 $= 1.6\cos\pi/3 + j1.6\sin\pi/3$
 $= 1.6(\frac{1}{2}) + j1.6(\frac{\sqrt{3}}{2}) = \boxed{0.8 + j0.8\sqrt{3}}$

Im
Re
 $\frac{\pi}{3} = 60^\circ$

(g) $z = 7e^{j3\pi/2} = 7\cos\frac{3\pi}{2} + j7\sin\frac{3\pi}{2}$
 $= 0 + j7(-1) = \boxed{-j7}$

Im
Re
 $\frac{3\pi}{2}$

(h) $z = 3 \angle 11\pi = 3e^{j11\pi} = 3e^{j\pi}$
 $z = 3e^{j\pi} = 3\cos\pi + j3\sin\pi$
 $\boxed{z = -3}$

Im
Re
 11π is 1980°
 $5\frac{1}{2}$ rotations