HW1 Solution

1.48 Given z_0 as a complex number with polar coordinates (r_0, θ_0)

(a) We can express $z_0 = r_0 e^{j\theta_0}$

$= r_0 \cos\theta_0 + j r_0 \sin\theta_0$

$= x_0 + jy_0$

Similarly, for $z_1 = r_0 e^{-j\theta_0}$

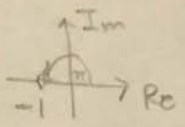
$= r_0 \cos\theta_0 - j r_0 \sin\theta_0$

$= x_0 - jy_0$

(c) $z_3 = r_0 e^{j(\theta_0 + \pi)}$

$= r_0 e^{j\theta_0} \cdot e^{j\pi}$

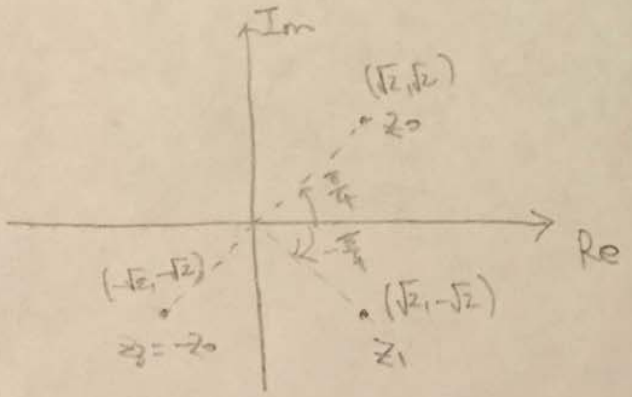
$e^{j\pi} = -1$



$= -r_0 e^{j\theta_0}$

$= -x_0 - jy_0$

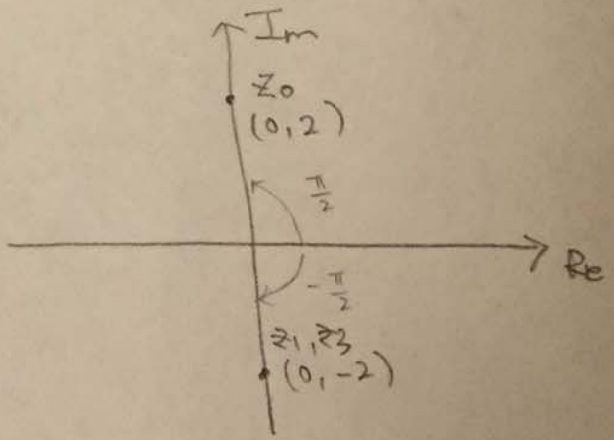
$= -z_0$



$\langle r_0 = 2, \theta_0 = \frac{\pi}{4} \rangle$ $z_0 = 2e^{j\frac{\pi}{4}}$

(a) $z_1 = 2e^{-j\frac{\pi}{4}}$

(c) $z_3 = -2e^{j\frac{\pi}{4}}$



$\langle r_0 = 2, \theta_0 = \frac{\pi}{2} \rangle$ $z_0 = 2e^{j\frac{\pi}{2}}$

(a) $z_1 = 2e^{-j\frac{\pi}{2}}$

(c) $z_3 = -2e^{j\frac{\pi}{2}}$