

Signals and Systems ECE 202

Assignment 2

1. Find all solutions of $z^2 - 2z + 10 = 0$
2. If $z_1 = 3 - j6$, $z_2 = 2 + j8$, and $z = x + jy$, find x and y in each case:
 - (a) $z = z_1 + z_2$
 - (b) $z = z_1 + z_2^*$
 - (c) $z = z_1 z_2$
 - (d) $z = z_1 / z_2$
 - (e) $z = 1 / z_1$
3. Find the magnitude and phase of these complex numbers
 - (a) $z = 1 + j$
 - (b) $z = -4 + j3$
 - (c) $z = \frac{2-j}{1+j3}$
4. If $z = x + jy = Ae^{j\theta}$, find x , y , A , and θ .
 - (a) $z = 4e^{1-j(\pi/2)}$
 - (b) $z = (-10e^{j(3\pi/2)})$
 - (c) $z = 2e^{-j\pi}/(1-j)^4$
 - (d) $z = e^{1+j} - e^{1-j}$
5. Find the fundamental period and fundamental frequency of each of these functions.
 - (a) $g(t) = 10 \cos(50\pi t + \pi/4)$
 - (b) $g(t) = \cos(2\pi t) + \sin(3\pi t) + \cos(5\pi t - 3\pi/4)$
 - (c) $g(t) = 4 \cos(\pi t/6) - 3 \sin(\frac{2\pi(t-2)}{8})$
6. Let $z_1 = 12 - 38j$, $z_2 = 18 + 48j$, $z_3 = 15 - 24j$, and $z_4 = 32 + 14j$. Find
 - (a) $z_p = 1/(1/z_1 + 1/z_2)$
 - (b) $z_s = z_3 + z_4$
 - (c) $v_{\text{out}} = \frac{z_s}{z_s + z_p} v_{\text{in}}$, where $v_{\text{in}} = 140 \text{ V}$ at 40 degrees ($140 \cos(\omega t + 40 \text{ deg})$)