ECE 1270
Su 08

HOMEWORK #13

THE
UNIVERSITY
OF UTAH

1.   Give numerical answers to each of the following questions:

   a)   Find the value of $z = 6 - j5 + -3 + j3$.

   b)   Find the magnitude of $z = 5 + j12$.

   c)   Find the conjugate of $z = \dfrac{2 + j2}{-j}$.

   d)   Find the real part of $z = e^{j\pi/2}$.

   e)   Find the value of $z = (6 - j5)(-3 + j3)$.

2.   Plot each of the following complex numbers as vectors in the complex plane:

   a) j

   b) $e^{j\pi/2}$

   c) $\dfrac{1 + j}{2} - \dfrac{1 - j}{2}$

   d) $\dfrac{1}{j^3}$

   e) $\dfrac{1 + j}{1 - j}$

3.   Give numerical answers to each of the following questions:

   a)   Rationalize $\dfrac{175 - j600}{-3 + j4}$. Express your answer in rectangular form.

   b)   Find the polar form of $\dfrac{1}{2} + j\dfrac{\sqrt{3}}{2}$.

   c)   Find the rectangular form of $5\angle 25° \cdot 8\angle 35°$

   d)   Find the magnitude of $\left(\dfrac{j^3}{2 + j4} \right)\left(\dfrac{30e^{j129°}}{2 - j} \right)$.

   e)   Find the real part of $\dfrac{(1 + j)^4}{1 + j\sqrt{3}}$.

4.   Write phasors (as both $Ae^{j\phi}$ and $A\angle\phi$) for each of the following signals:

a) $v(t) = 4\cos(100t + 30°)$ V

b) $i(t) = 7\sin(\omega t - 45°)$ mA

c) $i(t) = 50$ nF $\cdot \dfrac{d}{dt} 4\cos(100t + 30°)$ V

d) $v(t) = 17$ μH $\cdot \dfrac{d}{dt} 7\sin(60t - 45°)$ mA

e) $v(t) = 4\cos(100t + 30°)$ V $+ 3\sin(100t - 150°)$ V

5.   Given $\omega = 200$ rad/sec, write inverse phasors for each of the following signals:

a) $\mathbf{I} = 6e^{j45°}$ A

b) $\mathbf{V} = j9$ V

c) $\mathbf{I} = -2$ A

d) $\mathbf{V} = 6(1 + j)e^{j45°}$ V

e) $\mathbf{I} = e^{3+j45°}$ A $= e^3\angle 45°$ A