

1. Give numerical answers to each of the following questions:
 - a) Find the value of $z = 3 + j4 + -4 + j3$.
 - b) Find the magnitude of $z = 8 - j15$.
 - c) Find the conjugate of $z = \frac{j4}{1 - j}$.
 - d) Find the real part of $z = je^{j\pi/4}$.
 - e) Find the value of $z = (-4 - j3)(3 + j4)$.

2. Plot each of the following complex numbers as vectors in the complex plane:
 - a) $1 + j$
 - b) $e^{j\pi/2}$
 - c) $-\frac{1 - j}{2} - \frac{1 + j}{2}$
 - d) $\frac{1}{j^5}$
 - e) $\frac{-1 + j}{1 + j}$

3. Give numerical answers to each of the following questions:
 - a) Rationalize $\frac{25 - j60}{-12 + j5}$. Express your answer in rectangular form.
 - b) Find the polar form of $\frac{\sqrt{3}}{2} - j\frac{1}{2}$.
 - c) Find the rectangular form of $4\angle 5^\circ \cdot \sqrt{2}\angle 40^\circ$
 - d) Find the magnitude of $\left(\frac{j^j}{1 + j}\right)\left(\frac{6e^{j3.14^\circ}}{1 - j}\right)$.
 - e) Find the real part of $\frac{(1 - j)^2}{\sqrt{2} + j\sqrt{2}}$.

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

a) $v(t) = 6\cos(1kt + 45^\circ)$ V

b) $i(t) = 6\sin(\omega t + 45^\circ)$ mA

c) $i(t) = 5 \mu\text{F} \cdot \frac{d}{dt} 4\cos(1Mt + 45^\circ)$ V

d) $v(t) = 3 \text{pH} \cdot \frac{d}{dt} 2\sin(10t - 30^\circ)$ mA

e) $v(t) = \cos(10t + 60^\circ)$ V + $3\sin(10t - 30^\circ)$ V

5. Given $\omega = 1\text{k rad/sec}$, write inverse phasors for each of the following signals:

a) $\mathbf{I} = 12e^{j30^\circ}$ A

b) $\mathbf{V} = -j$ V

c) $\mathbf{I} = -7$ A

d) $\mathbf{V} = 4(\sqrt{3} + j)e^{j60^\circ}$ V

e) $\mathbf{I} = e^{-\pi - j30^\circ}$ A