

## Assignment - 01

- ① Find real numbers  $x$  and  $y$  such that  
 $2x - 3iy + 4ix - 2y - 5 - 10i = (x + y + 2) - (y - x + 3)i$
- ② Prove that (a)  $\operatorname{Re}\{z\bar{z}\} = \frac{(z + \bar{z})^2}{2}$   
(b)  $\operatorname{Im}\{z\bar{z}\} = \frac{z - \bar{z}}{2i}$
- ③ Express each equation in terms of conjugate coordinates: (a)  $2x + y = 5$  (b)  $x^2 + y^2 = 36$
- ④ Express each of the following complex numbers in polar form:  
(a)  $2 - 2i$  (b)  $-1 + \sqrt{3}i$  (c)  $-i$  (d)  $\frac{\sqrt{3}}{2} - \frac{3}{2}i$
- ⑤ Show that  $2 + i = \sqrt{5} e^{i \tan^{-1}(\frac{1}{2})}$
- ⑥ Graph each of the following and express in rectangular form.  
(a)  $6(\cos 135^\circ + i \sin 135^\circ)$  (b)  $2e^{\frac{5\pi i}{4}}$   
(c)  $5e^{7\pi i/6}$  (d)  $3e^{-2\pi i/3}$
- ⑦ Perform the indicated operations both analytically and graphically.  
(a)  $(2 + 3i) + (4 - 5i)$  (b)  $(7 + i) - (4 - 2i)$
- ⑧ Evaluate each of the following.  
(a) 
$$\frac{(3e^{\pi i/6})(2e^{-5\pi i/4})(6e^{5\pi i/3})}{(4e^{2\pi i/3})^2}$$
  
(b) 
$$\left(\frac{(\sqrt{3} - i)}{(\sqrt{3} + i)}\right)^4 \left(\frac{1 + i}{1 - i}\right)^5$$