Assignment 01: Complex Number.

1. Find the modulus & amplitude.

i) 1+ i \( \sqrt{3} \)

2

1 + 1 \( \sqrt{3} \)

 $X = 1, \quad y = \sqrt{3}$ 

 $|z| = \gamma = \sqrt{1 + 3} = \sqrt{1} = 1$ 

 $\theta = \tan^{-1} \left( \frac{\sqrt{3}}{2} / \frac{1}{2} \right)$ 

 $\theta = \tan^{-1}(\sqrt{3})$ 

 $\theta = T$ 

3

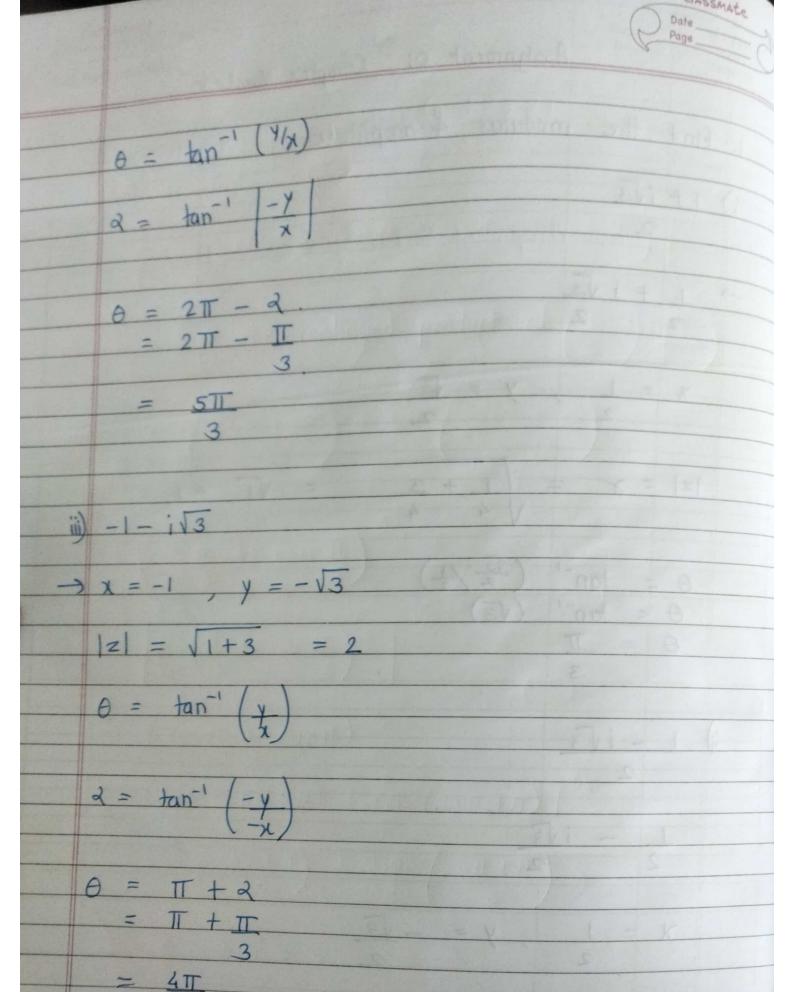
 $1 - i\sqrt{3}$ 

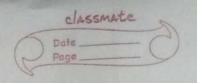
2

 $\frac{1}{2} - i\sqrt{3}$ 

 $\chi = \frac{1}{2}, \quad y = -\sqrt{3}$ 

 $|Z| = \delta = \sqrt{1 + 3} = \sqrt{1} = 1$ 





$$\frac{1}{\sqrt{2}}$$
  $\frac{1}{\sqrt{2}}$ 

$$y = 1$$
 $\sqrt{2}$ 
 $\sqrt{2}$ 
 $\sqrt{2}$ 

$$|z| = \gamma = \sqrt{1 + 1} = 1$$

$$\theta = \tan^{-1}\left(\frac{y}{x}\right)$$

$$a = tan^{-1} \left( -\frac{y}{x} \right) = tan^{-1} \left| -\frac{y}{x} \right|$$

$$\begin{array}{rcl}
\Theta &=& 2\pi - \alpha \\
 &=& 2\pi - \pi \\
4
\end{array}$$

$$\frac{7}{[(\cos\theta + i\sin\theta)^{-2}]((\cos\theta + i\sin\theta)^{3}]^{-5}}$$

$$\left[ \left( \cos \theta + i \sin \theta \right)^{-4} \right]^{12} \left[ \left( \cos \theta + i \sin \theta \right)^{-5} \right]^{-6}$$

$$= \frac{(\cos\theta + i\sin\theta)^{-14} (\cos\theta + i\sin\theta)^{-15}}{(\cos\theta + i\sin\theta)^{-48} (\cos\theta + i\sin\theta)^{+30}}$$

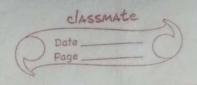
$$= \frac{(\cos\theta + i\sin\theta)}{(\cos\theta + i\sin\theta)}$$

$$= \frac{(\cos\theta + i\sin\theta)}{(\cos\theta + i\sin\theta)}$$

$$= \cos\theta + \sin\theta$$

$$= \cos\theta + \cos\theta$$

$$= \cos\theta$$



$$T=1, X2 = \cos 3T + i \sin 3T$$
,  $e^{i(3T_4)}$ 

$$K=2$$
,  $X_3 = cos 5\pi + isin 5\pi$ ,  $e^{i(5\pi \lambda)}$ 

$$K = 3$$
  $\chi_4 = (05.71T + isin.7TT), e i(71T/a)$ 

Continued product.

4. Find the all values of 
$$\begin{pmatrix} 1 & -i\sqrt{3} \\ 2 & 2 \end{pmatrix}$$

Comparing with 
$$x + iy$$

$$x = 1, y = -\sqrt{3}$$

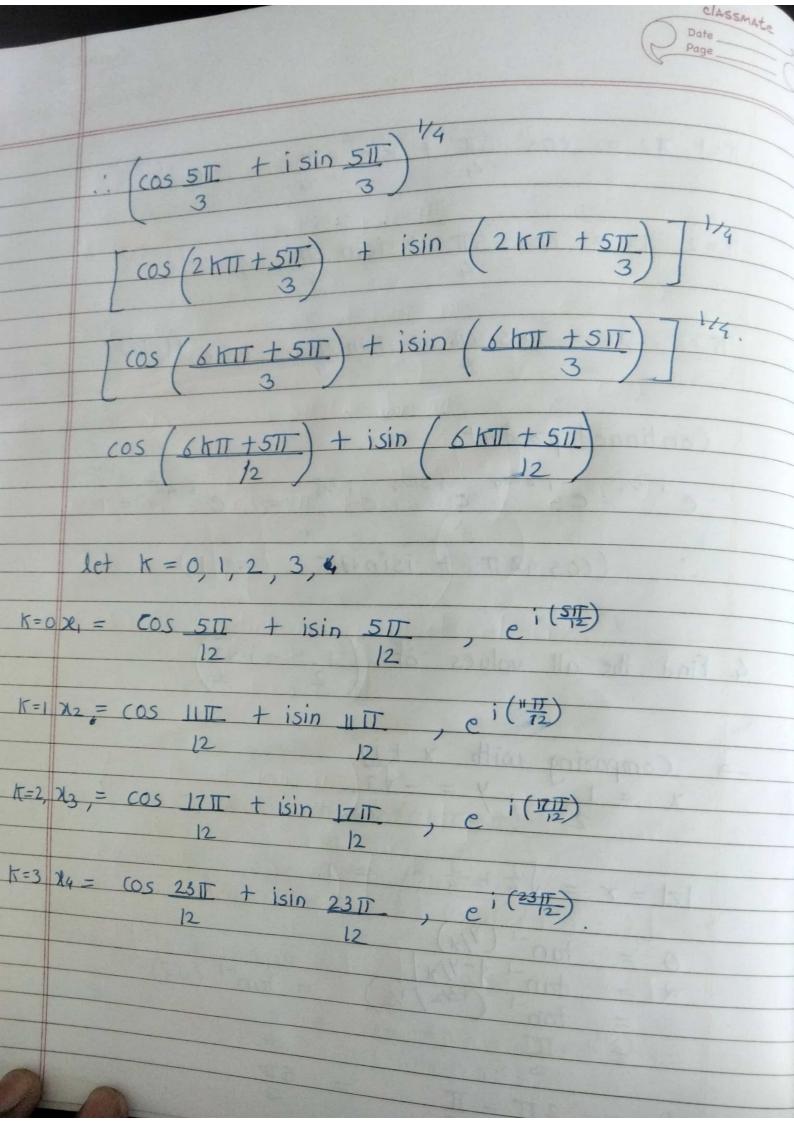
$$2$$

$$|Z| = \gamma = \sqrt{\frac{1}{4} + \frac{3}{4}} = 1$$

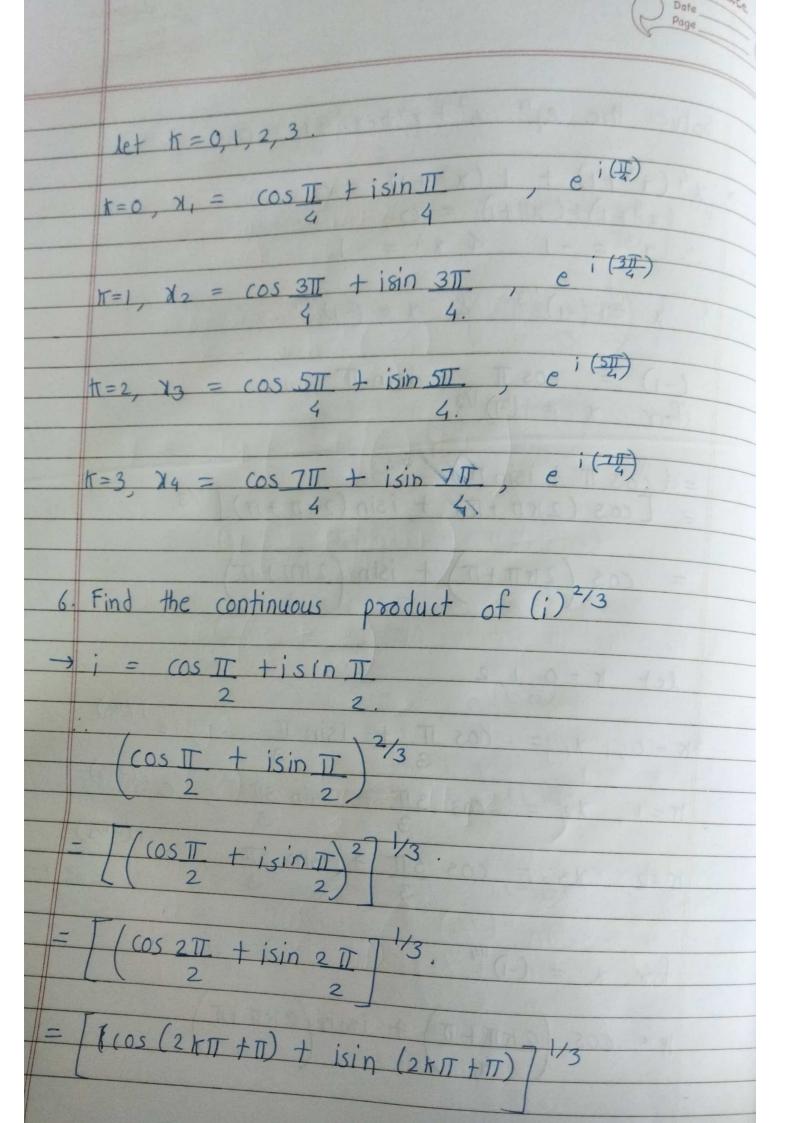
$$\theta = \tan^{-1} \left( \frac{y}{x} \right)$$

$$\theta = \tan^{-1} (\frac{y}{x})$$
 $\theta = \tan^{-1} (\frac{-y}{x})$ 
 $= \tan^{-1} (\frac{13}{2}/\frac{1}{2}) = \tan^{-1} (\sqrt{3})$ 

$$\theta = 2\Pi - \Pi = 5\Pi$$



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5. Solve the egn x7+x4+ x3+1 = 0
\chi = (-1)^{1/3} + \chi = (-1)^{1/4}
   (-1) = (OSTT + iSin TT)
for x = (-1)^{1/3}
  = (\cos \pi + i\sin \pi)^{1/3}.
= [\cos (2\kappa\pi + \pi) + i\sin (2\kappa\pi + \pi)]^{1/3}
  = \cos\left(\frac{2k\pi + \pi}{3}\right) + i\sin\left(\frac{2k\pi + \pi}{3}\right)
let 1 = 0,1,2
                                               , e i ( M3)
K = 0, \chi_1 = \cos \Pi + i \sin \Pi
K = 1, \chi_2 = \cos 3\pi + i \sin 3\pi, e^{i(3\pi/3)}
K = 2, \chi_3 = \cos 5\pi + i\sin 5\pi, e^{i(5\pi / 3)}
for x = (-1) 14.
R = \cos\left(2k\pi + \pi\right) + i\sin\left(2k\pi + \pi\right)
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$$= \cos\left(2\kappa\Pi + \Pi\right) + i\sin\left(2\kappa\Pi + \Pi\right)$$

let k = 0, 1, 2

21, = e i(17/3)

X2 = e i (311/3)

x3 = e i (5173)

 $e^{i(5173)}$   $e^{i(3173)}$   $e^{i(73)}$  =  $e^{i(73+373+517)}$ 

= = 1311

= Cos 3TT + isin 3TT

= -1

- 7. Determine whether following function is analytic if so find its desivative.

  i) sinhz
- 7. Separate into real & imaginary of part.

D) COS-1 (31/4)

$$cos^{-1}(3i/4) = \chi + iy$$

$$3i/4 = cos (\chi + iy)$$

$$0 + 3i/4 = cos \chi \cdot cos iy - sin \chi \sin iy$$

$$= cos \chi \cdot cos hy - i sin \chi \sin hy$$

 $R.P = \cos x \cosh y = 0$   $\cos x = 0$   $x = \pi$ 

 $3/4 = -\sin x \sin hy$   $3/4 = -\sin x/2 \sin hy$   $3/4 = -(1) \sin hy$  $\frac{1}{y} = \frac{3}{4}$   $y = \frac{3}{4}$   $y = \frac{3}{4}$   $= -\frac{3}{4}$   $= -\frac{3}{4}$  $= -109 \left( \frac{3}{4} + \frac{9}{16} + 1 \right)$ = -10g2 . Daippoi / 1000 of ai storage  $\cos^{-1}(3i/4) = \frac{1}{11} - 1\log 2$  $\cos^{-1}(ix) = \alpha + i\beta$   $ix = \cos(\alpha + i\beta)$ otix = cos & cos iB - sin & sin & B otix = cos & cos hB - isin & sin hy B

$$R \cdot P = \cos \alpha \cosh y P = 0$$

$$\cos \alpha = 0$$

$$\alpha = II$$

$$X = -\sin x \sinh \beta$$

$$X = -\sin x \sinh \beta$$

 $x = -(1) \sinh \beta$ 

$$Sinh\beta = -x$$

$$\beta = sinh^{-1}(-x)$$

$$= -sinh^{-1}(x)$$

$$y = -\log \left( x + \sqrt{x^2 + 1} \right)$$

$$9.8$$
 Find the real & imaginary part of log (xtiy).  
 $3.8$  Find the real & imaginary part of log (xtiy).  
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$$y = y \sin \theta$$
 $\theta = \tan^{-1} \left(\frac{1}{x}\right)$ 

by putting the values, we get,

$$Z = \log (x\cos \theta + ix\sin \theta)$$

$$= \log x (\cos \theta + i\sin \theta)$$

$$= \log x - e^{i\theta}$$

$$Z = \log x + \log e^{i\theta}$$

$$= \log (x^2 + y^2)^{1/2} + i\theta$$

$$Z = \log^{3} x + \log e^{i\theta}$$

$$= \log (x^{2} + y^{2})^{1/2} + i$$