29/02/2024. ætiy & - complex no. X, y E JR. & = Real pact. 0 1 2 3 4 Real axis y= Imaginater pact This two dimension i= V1 -nal plane is called Argand plane in complex. one dimension = d = (x-y). distance between two points =d= \((\arg -84)^2 + (y2-y1)^2 eg. $t = \sqrt{(3-0)^2 + (2-0)^2}$ 4 .= V13 o to 360 ← normal argument. -t to t ← principle value at argument. for z = ætiye¢ (f) Distance from origin or modulus of complex no. P mot stormers 1 z1 = V(80-0)2+(4-0)2 |z|=&=V@2fy2 (2) Amplitude of z. (4.7) 30 e 3001 Oztan- 1/8/ slop=tan. algorited with a order 3) conjugate. of complex. no. Z = 8-iy. If z=yi then it is called pure imaginary complex no (1841) (1841) 118-41 (1841) (1841)

(0 s)+(1-8)/ = 1 pg

bumpio lamiron - 008 of o

121=2=102+43

centropale, of complex no

to obstitute of

$$Z = \frac{(1+2i)}{1-(1-i)^2}$$

$$= \frac{(1+2i)}{X-(1-2i+i^2)}$$

$$= \frac{(1+2i)}{+2i+i^2}$$

$$pat i = -1$$
.
$$= \frac{(1+2i)}{(2i+1)} = 1$$
.

$$R=1+y=0$$
modulus = $x=|z|=\sqrt{1^2+0^2}=1$

Argument =
$$tan^{-1}\left(\frac{y}{x}\right) = 0$$
.

Since, $0 \in (-\theta_3, x)$

$$\frac{1-3i}{1-3i} \times \frac{1+3i}{1+3i}$$

$$\frac{1+2i}{1-3i} \times \frac{1+3i}{1+3i}$$

$$\frac{1+3i}{1+3i} \times \frac{1+3i}{1+3i}$$

$$= \frac{(1+2i)(1+8i)}{1^2+3i^2}$$

$$= \frac{(1+2i)(1+3i)}{1-9i^2}$$

put i = -1

i. we get

$$\frac{(1+2i)(1+3i)}{1-9} = \frac{(1+2i)(1+3i)}{10} = \frac{(1+2i)(1+3i)}{10} = \frac{(1+3i)+2i(1+3i)}{10} = \frac{(1+3i)+2i+6i^2}{10} = \frac{1+5i+6i^2}{10} = \frac{1+5i+6i^2}{10} = \frac{1+5i+6}{10} = \frac{5+5i}{10} = \frac{1}{2} \{1+i\} \}$$

Modulus $|z| = \sqrt{(-1/2)^2 + (1/2)^2} = \sqrt{\frac{1}{2}}$

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

$$\alpha = \frac{1}{\sqrt{2}}.$$

cargument =
$$\theta = \tan^{-1} \left| \frac{1}{2} \right|$$
.

= $\tan^{-1} \left| \frac{1/2}{-1/2} \right|$.

$$= tan^{-1}(1)$$

= $TT/4 -$

* Polar representation of complex no:-

Z = &+i4. = 2008 में १६९१०० = 2 (cosp+ ising).

Z = delo.

by comparing the values of a y
$$\theta$$
 lies in and quadrant
$$\frac{\theta = \pi - \alpha!}{\pi - \pi/4}$$

formulas 200

$$\frac{3+1}{3-1}$$

$$\frac{2+1}{3-1} \times \frac{3+1}{3+1}$$

$$= \frac{(2+1)}{3^2-1^2} + i(3+1)$$

$$= \frac{2(3+1)}{3^2-1^2} + i(3+1)$$

$$= \frac{6+2}{3} + i(3+1)$$

$$= \frac{6+2$$

formula = te'o.

$$\begin{array}{lll} & 2 + i & 3 + i & 3 + i & 3 + i & 3 + i & 3 + i & 3 + i & 3 + i & 3 + i & 3 + i & 2 & 3 + i & 3 + i & 2 & 3 + i & 3 + i & 2 & 3 + i & 3 +$$

formula = xeio.

* De-Moivre's Theorem:-(cose+ isine) = cos(ne)+ isin(ne) T-0 1] golve æ4-æ3+æ2-æ+1=0 Q-] 82+1=0 > 8e2=-1. œ= (-1)1/2. - (H-0) -1=(-1)+0==Z roet) t formula = ~= V (-1)2+(0)2=1 2°-1-(2-1)(2°-1+2°-2-+2+1)), 0=tan-1 |0| = tan-1(0). 20+1=(2+1)(20-1-20-2+---====+1). since (-1) is on - Ve x-axis To solve: -Since 05+1=(00+1) (004-003+002-00+1). if we want to solve the in (264-23+22-28+1) then we need i O=T == reio_(1)e'T to solve LHS (885+1). r(coso Hsino]. ₹=-1=(1)[cos(TT) + isin(TT)] 25+1=0. $\mathcal{R}^{5} = -1 \rightarrow \mathcal{R} = (-1)^{1/5}$ 2 = (-1) 1/2 = [COSTI + isinT] 1/2. 1===(-1)+0.1 = cos T/2 + isin [T/2] 2 = 0+i(1) $-1 = r(\cos \theta + i \sin \theta)$ steps: - i) Find roo -1= (1) (cosTT+isinTT). 2) Express constant in terms :(-1) = [cos(TT)+ isin(TT) /s of coso+sino. = [cos (TT+ 2nTT)+ isin (TT+ 2nTT)] 3) In power. 4) De-Moivres Theorem $\mathcal{C} = \cos\left[\frac{1+2n\pi}{5}\right] + i\sin\left[\frac{1+2n\pi}{5}\right]$ 1=0,1,2,3,4. (-1).

Q.1 find the roots of 804-803+002-00+1=0; -1=cos[T(2n+1)]+ isin[T(2n+1)] æn+1 = (8€+1) (æn-1-æn-2+.--æ+1) '(-1) /5 [cos(2n+1)π+isin@n+)π)/s $(x^{5+1}) = (x+1)(x^{4}-x^{3}+x^{2}-x+1)$ n=5 $82=(-1)^{1/5}=\cos\left(\frac{20+177}{5}\right)+i\sin\left(\frac{20+1077}{5}\right)$ n=0,1,2,3,4. 25+1=0. æ=-1 → æ=(-1)/5 -1 = 7= (-1)+0.1 n=1 $\alpha = \cos(\frac{8\pi}{5}) + i\sin(\frac{8\pi}{5})$ 7=V(-1)2+02=1 0 = tan-1(%)=0. -1 Lies on -ve x-aseis. 1æ= cos(str) + isin(str) . O=TT n=多 2=cos (717/2) + i sin (717/5) ..- 1 = Z= re18 -1= or (coso tising). 2= cos(9TT)+Bin(9TT/s) -1 =1 (cosTT + isinTT) 20 (0s(2nTT+0) = cost 4 sin (2011+0)= sino -1 = cos (TT+2nTT) + isin (TT+2nTT) -1 = cos(TT (2n+1)] + "sin(Tt(2n+1)] C-13/5=[cos(211+1)11 + isin(2n+1)11]/5.

Assurant da te

Q.2] find the continued product of the five values of the expression
$$(1+i)^{1/5}$$
 $2=1+i$ (1st quadrant).

 $T=\sqrt{1^2+1^2}=\sqrt{2}$.

 $9=\tan^4|1/1|=\tan^4(1)=\pi/4$.

 $2=1+i=\pi e^{i\theta}$
 $=\pi(\cos\theta+i\sin\theta)$.

 $(1+i)=\sqrt{2}\left(\cos\pi/4+i\sin\pi/4\right)$.

 $(1+i)=\sqrt{2}\left(\cos(\pi/4+2\pi\pi)+i\sin\pi/4\right)$.

 $(1+i)^{1/5}=\sqrt{2}\left(\cos(\pi/4+2\pi\pi)+i\sin\pi/4\right)$.

$$(1+i) = \sqrt{2} \left(\cos \left(\frac{1}{4} + 2n\pi \right) + i \sin \left(\frac{1}{4} + 2n\pi \right) \right]$$

$$(1+i)^{1/5} = \left\{ \sqrt{2} \left(\cos \left(\frac{1}{4} + 2n\pi \right) + i \sin \left(\frac{1}{4} + 2n\pi \right) \right] \right\}^{1/5}$$

$$= \left(\sqrt{2} \right) \sqrt{2} \left(\cos \left(\frac{1}{4} + 2n\pi \right) + i \sin \left(\frac{1}{4} + 2n\pi \right) \right) \left(\frac{1}{4} + 2n\pi \right) \right\}^{1/5}$$

=
$$(\sqrt{2})^{1/5} \times [\cos(\pi/4+2n\pi) + i\sin(\pi/4+2n\pi)]^{1/5}$$

= $2^{1/12} \times [\cos(\pi/4+2n\pi) + i\sin(\pi/4+2n\pi)]$ By Demoiver's theorem

$$2 = 2^{1/10} \cos \left[\frac{174 + 2 \pi \pi}{5} \right] + i \sin \left[\frac{174 + 2 \pi \pi}{5} \right] = 2^{1/10} \cos \left[\frac{9}{20} \right] \pi + i \sin \left[\frac{9}{20} \right] \pi$$

$$1 = 2^{1/10} \cos \left[\frac{9}{20} \right] \pi + i \sin \left[\frac{9}{20} \right] \pi$$

$$1 = 2 \cdot \frac{1}{10} \cos \left[\frac{9}{20} \right] \pi + i \sin \left[\frac{17 \pi}{10} \right]$$

$$2 = 2^{1/10} \left[\cos \left(\frac{1711}{20} + \sin \frac{1711}{20} \right) \right]$$

$$10 = 3$$

$$2 = 2^{1/10} \left[\cos \left(\frac{2511}{20} \right) + i \sin \left(\frac{2511}{20} \right) \right]$$

$$10 = 4$$

$$10 = 2^{1/10} \left[\cos \left(\frac{3311}{20} \right) + i \sin \left(\frac{3311}{20} \right) \right]$$

H.W. (1+1) 1/3.

(Troc+ AT) 181 + (Troc+ AT) 222] 324 = N/41

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(BUSH 4850) 6.2.

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