- www.jeevandeep.in -Nane: Pargat Singh ROU no: 16010121045 Let w= -1+i \( \square\) Batch: A2 Tutorial 3 then  $w^2 = -1 + i \sqrt{3} \times -1 + i \sqrt{3} = +1 - i \sqrt{3} - i \sqrt{3} - 3$ => -2-2i√3 => -1-i√3  $w^{3n+2} = w^2$  $\frac{-1+i\sqrt{3}}{2} + \frac{1-i\sqrt{3}}{2} \Rightarrow w^{n} + (w^{2})^{n} \rightarrow 3$ :. if n = 3k ±1  $=\rangle \omega^{3k+1} + \omega^{6k+2}$ =)  $w^{3k}$ .  $w + w^{6k}w^2$ =)  $w(1) + (1) w^2$  (Euom (1)  $w + w^2 = -1$  (similar of for 3k-1) :.  $\left(-1+i\sqrt{3}\right)^{k} + \left(-1-i\sqrt{3}\right)^{k} = -1$  (when  $n = 3k \pm 1$ ) Hence Croued. doub ted to come to for our a see = + 0 10 - 303

- www.jeevandeep.in-PAGE NO. Erom (3) => Wn + W2n if n = 3k => w3k + w6k => (1) + (1) (Evom (1)  $\frac{1}{2} \left( -\frac{1+i\sqrt{3}}{2} \right)^{n} + \left( -\frac{1-i\sqrt{3}}{2} \right)^{n} = 2$  (when n = 3k) Hence Proved. 2) x + iy = cos(u+iv) ... (given) →0 i) (1+2)2+ y2 = (cos hu + cos u)2 .... To Prone Z+iy= cos u cosiv - sin u siniv (From 1) ol = cosu coshu (: coshu = cosiu) y=-sir usirho (: siriv=isirho)  $(1+x)^2+y^2$  .... (LHS) (1+ cosu cosh v)2 H-sin u sin hv)2 1+2004 cosho + cos2 u cos2ho + sin2 u sin2ho 1+200 u cosh v + cos2 u (1+sin2hv) + sin2 u sin2h v 1+co2 4 + co2 4 sin2 ho + sin2 4 sin2 ho + 2 co 4 co ho 1+ cos 2 u + win2ho (win2 u + cos 2 u cos ho 1+ sin2hv + cos24 + 2cosucosho - cos2ho + cos2u + 2 cosu cosho LHS => ( co ho + cos u)2 LHS = RHS (Hence browned)

ii) (1-2c)2+42  $(1-\cos u\cos hv)^2+(-\sin u\sin hv)^2$ 1+cos²hu cos²u -2cosu coshu + sin²usin²hu => 1+(1+sin2hv)cos2u-2cosucoshv+sintusinhv > 1+00024+ sin2hvcos24+ sin24-sin2hv - 2 cos u cos h u =) 1 + cos 2 u + sin 2 hv (sin 2 y + tos 2 u) - 2 cos u cos hv =) (1 + sin2hv) + cos2 u - 2 cos u coshu =) (0) 2 h v + cos 2 u - 2 cos u cos hu LHS =) (cos N v - cos u)2 LHS = RHS Hence Bround. tan  $\left(\frac{\pi}{4} + iv\right) = 8e^{i\theta}$  (given)

i.  $\tan\left(\frac{\pi}{4} + iv\right) = 8\left(\cos\theta + i\sin\theta\right)$ tan (1/4 Itan iv = o (coo + i sin 0) 1-tan (17/4).taniv 1+ taniv - r (cos o + i wino) 1+ itanho x/+ itanho) = r(us 0+ i sino) 1-tan2hv)+2itanhv =>(us + i win 0) 1+tan=hu sec2ho+ 2itanho

It tan2ho

$$7 \sin \theta = (2 \tan h \omega) \rightarrow 3$$

$$1 + \tan^2 h \omega$$

$$\frac{2^{2}(\sin^{2}\theta+\cos^{2}\theta)}{1+\tan^{2}h} = \frac{\left|\sec^{2}h\right|}{1+\tan^{2}h} = \frac{2}{1+\tan^{2}h}$$

$$8^{2} = \sec^{4}h\omega + 4\tan^{2}h\omega$$

$$(1 + \tan^{2}h\omega)^{2}$$

$$\gamma^2 = (1 - \tan^2 h v)^2 + 4 \tan^2 h v$$

$$= (1 + \tan^2 h v)^2$$

$$8^{2} = \left[1 + \tan^{2}hv\right]^{2} = 1$$

$$\left[1 + \tan^{2}hv\right]^{2}$$

i) Hence Proved 8=1

tan 0 = 2 tanhu = 2 tanhu cos 2 hu sec 2 hu

tare of the tare

tano = 2 winho x cos 2 ho

tan 0 = win 2hv

Hence Proved

