OF STUDIES (a) Z= 1+2i W=1+i W=1-i $\Xi W = (1+2i)(1-i)$ Ò = 1 + 2 + 2i - i3+i $\frac{1}{1+i} \times \frac{1-i}{1-i}$ (ii) <u>1-i</u> -. 012 12-Alm(2)(b) (2 0 (I-1) • (1-1) 2 62-

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(C) (i) 2-i is a rost of P(z) because if the welficients are real (sand r real) then and zri is a root then the complex compate a also a root. P(z) = (z - 2 - i)(z - 2 + i)Q(z) $P(z) = ((z-2)^2 - i^2) Q(z)$ = (z²-Az + 5) (z + 4) by inspection (d) $= (\cos \theta - i \sin \theta)^n = \cos(n\theta) - i \sin(n\theta)$ For n=1: LHS= COOD-isinO RHS = CODO - CSINO : LHS=RHS and true for n=1 Assume its the for n=k where k >1 $(\cos \Theta - i \sin \Theta) = \cos(k\Theta) - i \sin(k\Theta)$ Now must prove for n=k+1 $(\cos \theta - i \sin \theta)^{k+l} = \cos((k+l)\theta) - i \sin((k+l)\theta)$ Cos ((k+1)0) - ism ((k+1)0) = coskocoso-sinkosino-i(sinkocoso+coskosino)

02/WB

OF STUDIES cooko coso - sinko sind - isinko coso - i cosko sind cost (costo - isinko) - sind (sinko) + i cos(ko) (LO) O (LO) - isin O) =/ sin O (sin (NO) + ices (NO)) - 5100 to (/who-ismy) 00 coold cos 0-isino -i sin \$0 (co cod(k0)(cos0-ism0) + sin(k0)(-SINO + -SIND-Ecoso) Smitted sin O (-sin(ko)+icos(ko)) (e) $= 2(\cos\theta + i\sin\theta)$ 2 cos Q+im 2isin Q (i)1 - 2000 - 215in 0 x 1-2000+2isind (ii 1-2000-zisind 1-7 2000+2isin0 2000 - Zismo $(1 - 2\cos\theta)^2 + 4\sin^2\theta$ $1 - 2 \cos \theta^{2} + 4 \sin^{2} \theta$

RD OF STUDIES 1-2000 Re 4000+240020+ coro 1-2000 $1 - 4\cos 0 + 4\cos^2 0 + 4 - 4\cos^2 0$ 1-2000 5-4000 $= -2sin\Theta$ $(1 - 2600)^2 + 4\sin^2\theta$ - 2 sin O 5-4000