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Normal Seebgroup: Let H be a subgroup of GI under #. Then H & said to be a nonmal subgroup of G. for evy. regand for het 93 2*b*x-1EH and x+H*x+ CH Alterbatively, a subgroup H of G1 % called a bormal Subgroup of G1 95 x * h = h * x, Y x E G1. Theorem: 1 The Protessection of any 2 normal subgroups 's a pormal Subgroup. Ploop: let H and K be the 2 normal subgroups. => It and K are subgroups of Gr. => HDH & a subgroup of G (Already Ploved) Now we've to prove that HOK & normal. let XEG and hEHDK xEG and hEH and hEK => xEG, and bEH and XEG, bEK > x + b + x T E H and x + b + x T E K G(1) (: Hand K are Borman Flom (1) and (2), we get Subgeoups) X*b*x EHOK > HOK is a normal subgroup of G.





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Let G and G' be any two groups with Theosem 2: 9 dentify ett: e and e' nesty. If f: G > G' be a bomomorphism, then hor (f) & a normal subgroup proof: Let $K = Kor f = \frac{3}{2} \times EG [f(x) = e']$ we know that her (f) is a subgroup of G Now we've to preve that Ker (f) is normal. TO PHONE &* h*x TEH Let reg and he k : $f(x*h*x^{-1}) = f(x) + f(h) * f(x^{-1})$ ·· fis a homo. = f(x) * e' * f(x) [:: hek= kerf] = f(x) * f(x+) = f(x * x-1) = f(e)= 01 f(x*b*x-1) = e1 => x * h * x = E H : K=Ker f & a polmal subgroup of G.





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Theoriem: 3 Fundamental Theorem of Homomouph9300 Every homomosphic amage of a group of Bomosphic to some quotient group of G. 98 (0.2) Let f: GI > GIT be a onto honomon phils no of groups write keeper K. Then Gy ~ GI'. Peood : Let f: G > G' be a homomolphism Let I be the tenner of this home, clearly to BB a polmal Subgroup of G. TO PLOYE GIK & SEOMONPHIC GIK ~ GI 1). To peove of B well defended. Let $\phi: G'/K \to G'$ by $\phi(K \neq a) = f(a)$. Consider. ちゃのニちゃら => a*b EK \Rightarrow f(a*b⁺)=e' f(a) * f(b) = e' $f(a) * [f(b)]' = e^{i}$ f(a) * [f(b)] * f(b) = e' * f(b) $f(a) \neq e = e' \neq f(b)$ f(a) = f(b) $\phi(\kappa*a) = \phi(\kappa*b)$: \$ is well defined ii). To plove \$ 28 1-1. $e_{\mu} \phi(H*a) = \phi(H*b) \Rightarrow H*a = H*b$ consider $\dot{\phi}(\kappa \star a) = \dot{\phi}(\kappa \star b)$





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f(a) = f(b)f(a) * f(b') = f(b) * f(b') $f(a * b^{-1}) = f(b * b^{-1})$ = f(e)=e! => a*b EK K*a=K*B ·· \$ is 1-1. iii). To peove of B obto, Let bEG' Bance file onto. Jan elt. a EGI Such that f(a) = b. \Rightarrow f(a) = ϕ (k*a) = b i. o le osto, iv). To peore of is a home, Noco, $\phi(\kappa*a*\kappa*b) = \phi(\kappa*q*b)$ = f(a * b)= f(a) * f(b)= \$(\$*9) * \$(\$* b) of & a borno. 2700 p B 1-1 8 0050, homo, · \$ is an ecomosphe & m b/co G1/45 and G1 \Rightarrow GIK \simeq G¹.