Eg. We want to find all homomorphisms ϕ from Z_7 to Z_{12}. To do^s this we first consider the possible kernals of ϕ. We know that kernal is a subgroup of Z_7. The possible subgroups are of order 1 and 7 as the subgroup order must divide that of Z_7. There cannot be an injective homomorphism as subgroup in Z_{12} cannot have order of 7. Hence the only possible is mapping all elements to zero.

Eg. If g is a generator then for ϕ s.t. $\phi(n) = g^n$. The kernal of ϕ is nZ

Isomorphism Theorems

An isomorphism is a bijecive homomorphism. Factor groups correspond to homomorphic images. Every group homomorphism is associated with a normal subgroup $ker\phi$ and every normal subgroup gives rise to homomorphism of groups.

If H is a normal subgroup of G, k