1. Suppose p : G --> H and GCD(|G|,|H|)=1.

|G| = |imp| |kerp| so |imp| **|** |G|

We know |imp| <= H (by FIT). So |imp| **|** |H| by lagranges theorem.

So |imp| = 1 🡪 imp = {1}.

1. Let H be the quaternion group elements { i, j, k, 1, -i. -j, -k, -1} .
2. H is obviously normal.

{1}

{i, -i, 1, -1} where i can be j or k as well

{1,-1}

If i,j are in a group then k is in it too, (must have all i,j,k none, or one)

1. Cyclic group order 16.

Z4 x Z4

D8

Z2 x Z8

D4 x Z2

H x Z2

1. Show that p is a homomorphism R 🡪 U and Kerp = Z.

Let p(x): R 🡪 U : x – Floor(x)

It map the sum of real numbers to their decimal remainder and you get a homomorphism.

Let u be in U. 0<=u<1. [0,1) <= R so …..

p(r

4)

(a) Prove: T is an isomorphism.

Homomorphism: T(xy) = a(xy)(-a) = ax(-aa)y(-a) = T(x)T(y)

~~Injective: Suppose T(x)=T(y). Then ax(-a)=ay(-a) so clearly x=y.~~

~~Surjective: Let g,a be in G. -a is in G. So -aga = g’ for some g’ in G.~~

Construct an inverse instead

(b)

T1(x) = 1x1 = x so T1 = 1G.

Tab(x) = (ab)x(-b-a) = a(bx-b)-a = Ta [Tb(x)]

T-a(x) = -axa and Ta(x) = ax-a T-a(ax-a) = -a(ax-a)a = x so T-a o Ta = 1G so T-a = [Ta]-1