Rec 9/12

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1.13 #2 Show there is no simple gp of order pq (p, q primes

$p = q \Rightarrow \exists$ p-subgp & its normal (index p from HW problem). (has nontrivial center)

$p < q \Rightarrow n_q = 1 \bmod q$ & $n_p \mid p \Rightarrow n_q = 1$ so q is normal.

1.13 #6 Show every nonabelian gr of order 6 is isomorphic to S_3.

$n_2 = 1$ & $n_3 = 1 \longrightarrow$ bad

$\vdots$

Recall:

- $[x] = {}^{G}x = \{gxg^{-1} \mid g \in G\}$

- Note: if G is abelian, $[x] = \{x\}$.

Goal: describe conj classes of S_n.

- for $\sigma \in S_n$, $\sigma = \underbrace{\pi_1 \cdots \pi_r}_{\text{disjoint cycles}}$

- Let k_i = length of π_i

σ has cycle type $(k_1, \ldots, k_r)$ with $k_1 \geq \cdots \geq k_r$ and $\sum_{i=1}^{n} k_i = n$.

· Conj. each cycle: $\alpha \sigma \alpha^{-1} = \alpha \pi_1 \alpha^{-1} \alpha \pi_2 \alpha^{-1} \cdots \alpha \pi_k \alpha^{-1}$.

<u>claim 1</u>: σ, τ are conj iff σ, τ have same cycle type

<u>claim 2</u>: Conj. classes of $S_n \iff \lambda \vdash n$