DAY 36: THW #8 is posted due Monday @ 9:25 mins

Study §13 pg 133: 1-24, 28, 29
44, 45, 47, 48, 50

Look ahead m w F - Ex II
m w F - last day

1 more HW assignment

W 10:30 - 12:30

Last time: homomorphism
ex: see last, which was an iso.
ex: Let $S_n$, the symmetric group on $n$ letters (as usual). Let

$$\psi: S_n \to \mathbb{Z}_2$$

be defined by

$$\psi(\alpha) = \begin{cases} 0 & \text{if } \alpha \text{ is even} \\ 1 & \text{if } \alpha \text{ is odd} \end{cases}$$

Think about: $\psi(\alpha \beta) = \psi(\alpha) +_2 \psi(\beta)$

We believe (cases) $\psi$ is a homomorphism.

Notice: $\{ \alpha \in S_n \mid \psi(\alpha) = 0 \} = A_n$
Defn: Let \( \varphi \) be a mapping of a set \( X \) into a set \( Y \). Let \( A \subseteq X \) and \( B \subseteq Y \). The image of \( A \) in \( Y \), denoted \( \varphi[A] \), is \( \{ \varphi(a) | a \in A \} \). The inverse image of \( B \) in \( X \), denoted \( \varphi^{-1}[B] \), is \( \{ x \in X | \varphi(x) \in B \} \).

Theorem: Let \( G, G' \) be groups. Let \( \varphi : G \rightarrow G' \) be a homomorphism.

1. If \( e \) is the identity in \( G \), then \( \varphi(e) \) is the identity of \( G' \).
2. If \( a \in G \), then \( \varphi(a^{-1}) = (\varphi(a))^{-1} \).
3. If \( H \) is a subgroup of \( G \) then \( \varphi[H] \) is a subgroup of \( G' \).
4. If \( K' \) is a subgroup of \( G' \), then \( \varphi^{-1}[K'] \) is a subgroup of \( G \).