1. Suppose \( n \geq 2 \), and \( \sigma \in S_n \) satisfies \( \sigma(1) = 2 \). Define \( H_1 = \{ \tau \in S_n | \tau(1) = 1 \} \) and \( H_2 = \{ \tau \in S_n | \tau(2) = 2 \} \).

Show that:

(a) If \( \tau \in H_2 \), then \( \sigma^{-1}\tau\sigma \in H_1 \).

(b) If \( \rho \in H_1 \), then there exists \( \tau \in H_2 \) such that \( \rho = \sigma^{-1}\tau\sigma \).

2. Page 21, #34.

3. Prove that \( (a \cdot_n b) \cdot_n c = a \cdot_n (b \cdot_n c) \), for all \( a, b, c \in \mathbb{Z}_n \).

4. Page 46, #1(d).


Late Collected Homework papers will be penalized 10% per day. No late papers will be graded after the homework has been returned.