

Advanced Algebra I

Homework 5

due on Nov. 3, 2006

- (1) * Complete the uncompleted proof in the lecture. Especially, Zassenhaus Lemma.
- (2) What is the Sylow 2-subgroup of $SL(2, 3)$?
- (3) Show that $SL(2, 3) \not\cong S_4$ but that $PSL(2, 3) \cong A_4$.
- (4) Find a composition series of $GL(2, 7)$.
- (5) Assume that $\prod_{i=1}^n H_i \cong \prod_{j=1}^m K_j$ with each H_i, K_j simple. Show that $n = m$ and there is a permutation of $\{1, 2, \dots, n\}$ with $K_{\pi(i)} \cong H_i$ for all i .