MODERN ALGEBRA I GU4041

Homework 5, due October 12: Permutations

1. Judson, Section 5.4, exercise 1 and 2 (a)-(d), 2(f), 2(j), 2(m).

2. Let S_n denote the group of permutations of n letters. List the possible orders of all elements of S_7 and exhibit an element whose order is maximal and write it as the product of disjoint cycles.

3. Find two permutations of 4 letters σ and τ such that $\sigma^2 = \tau^2 = e$ but $\sigma\tau \neq \tau\sigma$.

4. Draw a pentagon and label its corners $1, 2, 3, 4, 5$. Let $D \subset S_5$ be the set of permutations of the corners that take adjacent corners to adjacent corners. Show that D is a subgroup of S_5. What is its order?

5. What are the orders of the following permutations?
(a) (231) in S_3 (b) $(165)(234)$ in S_6 (c) $(14235)^2$ in S_5.

Recommended reading

Judson book, Section 5.1; Howie's notes, Chapter 4.