

Math 221A, problem set 07
Due: Mon Nov 01
Last revision due: Mon Dec 06

Problems to be turned in: Problem x.y.z of Artin denotes problem y.z in Chapter x.

1. Artin 7.2.2.
2. Enumerate the conjugacy classes of S_4 , and for each conjugacy class \mathcal{C} :
 - Find the number of elements in \mathcal{C} .
 - Identify the isomorphism type of the centralizer of an element of \mathcal{C} .
 - Verify the orbit-stabilizer theorem for the action of S_4 on \mathcal{C} by conjugation.
3. Artin 7.2.14.
4. Artin 7.3.3. (You may assume Artin 7.3.2.)
5. Artin 7.4.4.
6. Artin 7.4.8.
7. Assume $n \geq 5$.
 - (a) Let N and K be normal subgroups of a group G . Prove that $N \cap K$ is normal in G , and therefore, normal in both N and K .
 - (b) Prove that if N is a normal subgroup of S_n , then N is either 1, A_n , or S_n . (Suggestion: Consider $N \cap A_n$.)