

UNIVERSITY OF ST ANDREWS
School of Mathematics and Statistics
MT4603 Groups: Tutorial 9.

1. Consider the dihedral group D_n , where n is odd, and let α and β denote the standard generators of D_n . Find the normalisers of the following elements: β, α^i ($0 \leq i < n/2$). Determine the conjugacy classes of D_n . What are the conjugacy classes of D_n when n is even?
2. Let G be a group, and let H and K be subgroups of G . Prove that if H and K are conjugate in G then so are their normalisers $N(H)$ and $N(K)$.
3. Prove that if G is a p -group and $H \trianglelefteq G$ then the intersection $H \cap Z(G)$ is non-trivial. (Hint: H is a union of conjugacy classes of G .)
4. Let G be a non-abelian simple group. Prove that every conjugacy class of G apart from $\{e\}$ has more than two elements.