

**MATH 473**  
**FALL 2019**  
**HOMEWORK 14**

1. Prove that the 5-cycle  $(1\ 2\ 3\ 4\ 5)$  does not commute with any odd permutation in  $S_5$ .
2. Prove that  $A_5$  is a simple group.
3. Find all normal subgroups of the quaternion group  $Q$  of order 8.
4. Find a basis for the center of  $\mathbb{C}G$ , when  $G$  is the dihedral group of order 10.