MODERN ALGEBRA
SPRING 2019

ASSIGNMENT 12.1
DUE MAY 1

Exercise 1. Given $n \in \mathbb{N}$ at least 3, let $\zeta_n = \cos(2\pi i/n) + i\sin(2\pi i/n) = e^{\frac{2\pi i}{n}}$. Define $R, F \in \mathrm{Perm}(\mathbb{C})$ by $R(z) = \zeta_n z$ and $F(z) = \overline{z}$. Prove that the subgroup $\langle R, F \rangle$ of $\mathrm{Perm}(\mathbb{C})$ is isomorphic to D_n.

Exercise 2. Find all normal subgroups of D_n.

Exercise 3. Regular polygons are not the only geometric objects with symmetry groups. Determine the symmetry group of the regular tetrahedron.