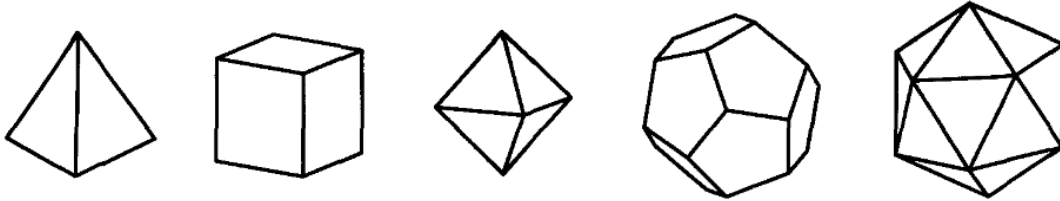


PROBLEMS FROM DAY 2

AFS I: ALGEBRA



Problem 1. Determine the class equation for:

- (a) the tetrahedral group (i.e. the rotation group of the regular tetrahedron), and
- (b) the octahedral group (i.e. the rotation group of the cube).

Problem 2. (a) Show that the octahedral group is isomorphic to S_4 .
(b) Show that the tetrahedral group is isomorphic to A_4 .

Problem 3. Let G be a group and let S be set. Prove that there is a bijection between the the set of group actions of G on S , on the one hand, and the set of group homomorphisms from G to $\text{Perm}(S)$, on the other hand.

Problem 4. Let S be the set of subsets of order 2 in the dihedral group D_3 . Determine the orbits for the action of D_3 on S by conjugation.

Problem 5. List all subgroups of D_4 , and divide them into conjugacy classes.