

MA 541: Modern Algebra I / Fall 2019
Homework assignment # 2
Due 9/17/2019

- Read F section 5.
- Solve F problems 5.4, 5.6, 5.14, 5.16, 5.20, 5.30, 5.40, 5.43.
- Solve the following problem.

Let G be the group of symmetries of an equilateral triangle discussed in class. Recall that we proved that G has 6 elements: the identity symmetry e , two nontrivial rotations, and three flips (or reflections). To fix notation, let r be a rotation by 120° counterclockwise, so that the two nontrivial rotations in G are r and r^2 . To keep track of the flips, let A be the lower left vertex of the triangle, B the top vertex, and C the lower right vertex of the triangle; and write f_A , f_B , or f_C for the flip that leaves vertex A , B , or C stable, respectively.

- (a) Give the group table for G .
- (b) Draw a subgroup diagram for G .
- (c) Is G isomorphic to \mathbb{Z}_6 ? If yes, give a function $\mathbb{Z}_6 \rightarrow G$ defining the isomorphism. If not, explain why not.