Math 566: Abstract Algebra I
Homework 1

10 points total. Due Friday, Aug 27 by 11:10 am in class.

Problems

1. Consider the symmetries of Euclidean transformations that fix the square with vertices (1,0), (0,1), (-1,0), (0,-1). (You may assume in this problem that there are exactly 8 of them; we will show how to prove this later in the course.)
   - (1 point) Write down a 2×2 matrix that represents each of the symmetries.
   - (1 point) Label the four vertices of the square by $1, 2, 3, 4$ (you may choose how to label them) and write down each of the symmetries as a permutation in cycle notation.
   - (2 points) Give each of the symmetries a label, and write down the full 8×8 multiplication table showing how the symmetries compose with each other (like we did in class for the hexagon).
2. (1 point each) Problems 1.3, 1.6, 5.1 from Chapter 1 of Artin's textbook.
3. (3 points) Problem 1.7 from Chapter 1 of Artin's textbook.