

Homework 6

due November 13, 2015 in class

Read: Artin 5.1, 6.1, 6.2

1. **Artin 5.1.1(a)** pg. 150
What is the matrix of the three-dimensional rotation through the angle θ about the axis e_2 ?
2. (a) Prove that O_n and SO_n are subgroups of $GL_n(\mathbb{R})$, and determine the index of SO_n in O_n .
(b) **Artin 5.1.3** pg. 150
Is O_2 isomorphic to the product group $SO_2 \times \{\pm I\}$? Is O_3 isomorphic to $SO_3 \times \{\pm I\}$?
3. Let A be a matrix in O_3 whose determinant is -1 . Prove that -1 is an eigenvalue of A .
4. Prove that an isometry, as defined by Artin (6.2.1), is bijective.
5. **Artin 6.1.1** pg. 188
List all symmetries of the following figures.
(a) (6.1.4) (b) (6.1.5) (c) (6.1.6) (d) (6.1.7)
6. Let G be a finite group of rotations of the plane about the origin. Prove that G is cyclic.