

Homework 4

Due Wednesday, May 1st, at noon

You are encouraged to work together with others, but you must write up the solutions on your own. All numbered exercises are from Dummit and Foote, third edition.

1. 14.1.7
2. 14.1.8
3. 14.2.13
4. If α is a complex root of $x^6 + x^3 + 1$ find all field homomorphisms $\phi : \mathbb{Q}(\alpha) \rightarrow \mathbb{C}$.
5. Let $d > 0$ be a square-free integer. Show that $\mathbb{Q}(\sqrt[8]{d}, i)/\mathbb{Q}(\sqrt{d})$ is Galois and determine its Galois group explicitly. Show that $\text{Gal}(\mathbb{Q}(\sqrt[8]{d}, i)/\mathbb{Q}(\sqrt{d}))$ is isomorphic to the dihedral group with 8 elements by giving an explicit isomorphism.