# Assignment 15

## Definition of automorphism group

1. Show that $\mathrm{Aut}(\mathbb{C}/\mathbb{R}) = \{\mathrm{id}, \sigma\}$, where $\sigma$ is the complex conjugation.

2. Determine $\mathrm{Aut}(\mathbb{F}_9/\mathbb{F}_3)$.

3. Determine all irreducible polynomials of degree $1, 2, 3, 4, 5$ in $\mathbb{F}_2[X]$.

4. (a) Show that $X^4 + 1 \in \mathbb{Q}[X]$ is irreducible.
   (b) Show that $X^4 + 1$ is reducible in $\mathbb{F}_p[X]$ for every prime $p$.