

Mathematics 204A Homework 3

Due: Friday 20 October 2023

1. (Neukirch, section 2, Exercise 7) Suppose $K/\mathbf{Q}$ is an algebraic number field, and $\omega_1, \dots, \omega_n$ is a $\mathbf{Z}$ -basis of the ring of integers $\mathcal{O}_K$. Set $d_K = \text{disc}(\omega_1, \dots, \omega_n)$. Then d_K is independent of the choice of integral basis of $\mathcal{O}_K$, and is called the discriminant of K . Prove that the discriminant d_K is always congruent to 0 or 1 modulo 4. (See the hint in the text.)
2. Problem 3.0.7 of the Gauss composition worksheet.
3. Problem 3.0.9 of the Gauss composition worksheet.