

# Math 567: Abstract Algebra I

## Homework 12

10 points total. Due Friday, Apr 22 by 1:10 pm in class.

### Problems

1. (5 points, one point per part) Artin chapter 16 problem 1.1 (all parts)
2. (2 points) Artin chapter 16 problem 3.1
3. (3 points, one point per part) Artin chapter 16 problem 3.2

### Bonus Problem

(+1 point:) The **Lindemann-Weierstrass theorem** says that if  $\alpha_1, \dots, \alpha_k$  are algebraic numbers over  $\mathbb{Q}$ , then  $e^{\alpha_1}, \dots, e^{\alpha_k}$  are algebraically independent over  $\mathbb{Q}$ . Think about what this theorem says in the case  $k = 1$ , and use it to prove that  $\pi$  is transcendental.