

**Math 784**  
**Homework 1**

Due Thursday, Feb. 7.

**Problems:**

Do four of the five problems.

1. Find a monic polynomial  $f(x) \in \mathbb{Z}[x]$  satisfied by  $\alpha = 1 + \sqrt{2} + \sqrt{3} + \sqrt{6}$ .
2. Let  $\alpha_1, \dots, \alpha_n$  be algebraic integers and suppose that  $\beta$  is an algebraic number such that

$$\beta^n + \alpha_{n-1}\beta^{n-1} + \dots + \alpha_1\beta + \alpha_0 = 0.$$

Show that  $\beta$  is an algebraic integer.

3. Marcus §2, #11, #12 a.
4. Marcus §2, #15.
5. Marcus §2, #16.