

## 392 HOMEWORK 2

- Quite soon I am going to start working on sections 4.1 and 4.2 of the book. We'll spend at least two weeks, maybe more, on this material. So you should start reading the presentation in the book to keep ahead of the game...
- Exercises 3.2: 10.
- Exercises 4.2: 1 (you might want to look back at your notes from last term to remind yourself of the definition of "isomorphism").
- Exercises 4.1: 9, 14(a)(c).
- Suppose that  $f(x)$  is a monic polynomial in  $\mathbb{Q}[x]$ . Let  $\alpha \in \mathbb{Q}$  be a root of  $f(x)$ . Show that  $\alpha \in \mathbb{Z}$ . (*Hint.* Let  $\alpha = \frac{a}{b}$  with  $GCD(a, b) = 1$ . Let  $f(x) = x^n + a_{n-1}x^{n-1} + \cdots + a_1x + a_0$ . Now substitute  $\alpha$  in for  $x$  and multiply through by  $b^{n-1}$ .)

Use the result you just proved ("rational roots of polynomials in  $\mathbb{Q}[x]$  are integers") to do:

- Exercises 3.3: 2(a)(c)(e), 4(a).