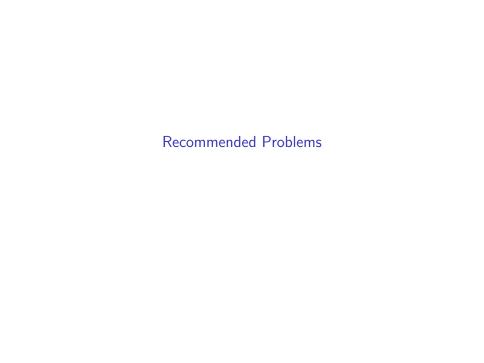
Recommended Problems



Problem 1

Find the splitting fields of the following polynomials over \mathbb{Q} :

a. $x^4 - 2$

Hints:

- irreducible by Eisenstein
- $ightharpoonup \mathbb{Q}(\sqrt[4]{2})$ is real of degree 4.
- ▶ If $\alpha = \sqrt[4]{2}$, then the four roots are $\pm \alpha$, $\pm i\alpha$.

b. $x^4 + 2$

Hints:

- irreducible by Eisenstein
- ▶ If $\alpha = \sqrt[4]{-2}$, then the four roots are $\pm \alpha$, $\pm i\alpha$.
- The square root of i is $e^{\pi/4} = \sqrt{2}/2 + i\sqrt{2}/2$, so in fact $\mathbb{Q}(\sqrt[4]{2})$ is in $\mathbb{Q}(i,\alpha)$.

c.
$$x^4 + x^2 + 1$$

Hints:

▶ If α is a root of this polynomial, then α^2 is a root of $x^2 + x + 1 = 0$ and the roots of this polynomial are

