

## Exercises for week 6

**Problem 1.** Find  $a \in \mathbb{C}$  such that

$$2x^6 - x^5 - 11x^4 - x^3 + ax^2 + 2ax + 8$$

has 2 as its root.

**Problem 2.** Find a polynomial in  $\mathbb{C}[x]$  with roots  $1/2, i, 2 - i$ .

**Problem 3.** Find all rational roots of the polynomial

$$12x^6 + 8x^5 - 85x^4 + 15x^3 + 55x^2 + x - 6.$$

**Problem 4.** Describe all irreducible polynomials in  $\mathbb{R}[x]$ .

**Problem 5.** Find all at least double complex roots of the polynomial

$$16x^4 - 88x^3 + 108x^2 - 50x + 8.$$

**Problem 6** (needs a trick). Find a polynomial in  $\mathbb{Z}[x]$  with a root  $\cos(\pi/7)$ .