

Reading/Blogging Assignments

Come to class on

- Monday having read and blogged on section 1.5
- Wednesday having read and blogged on section 1.6
- Friday having read and blogged on section 1.7

Problem Set 2, Due September 10

Feel free to do some experimentation via a computer algebra system to develop intuition for the problem.

1. Problems 7 and 8 in the notes.
2. Problem 13 in the notes.
3. Prove that the following are equivalent: A polynomial of degree n
 - has a repeated factor
 - f and $f' := df/dx$ have a common factor
 - the $2n - 1$ polynomials $f, xf, \dots, x^{n-2}f, f', xf', \dots, x^{n-1}f'$ are linearly independent in the vector space of polynomials of degree $2n - 2$.
4. Let $\alpha = \sqrt[3]{2} \in \mathbb{R}$ and let ω be a primitive cube root of unity in \mathbb{C} . Prove that the set of all numbers $p + q\alpha + r\alpha^2$, for $p, q, r \in \mathbb{Q}$ is a subfield of \mathbb{C} . Also show that the map

$$p + q\alpha + r\alpha^2 \mapsto p + q\omega\alpha + r\omega^2\alpha^2$$

is injective onto its image, but not an automorphism.