Reading/Blogging Assignments

Come to class on

1. Wednesday having read 4.1
2. Friday having read the proof Theorem 4.3 carefully
3. Monday having read 4.2 up through the proof of Proposition 4.8
4. Wednesday having read the rest of 4.2
5. Friday ready to take a midterm

Problem Set 7, Due November 1

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

1. Let k and be a field of characteristic p. Consider the map $\phi : k \to k$ given by $\phi(x) = x^p$.
   (a) Show that ϕ is a homomorphism.
   (b) Show that ϕ fixes the prime subfield of k.
   (c) How many fixed points does ϕ^2 have?
2. Find the splitting field over $\mathbb{Q}$ for the polynomial $x^4 + 4$. Find the Galois group over $\mathbb{Q}$ for the same polynomial.
3. Construct a tower so that L over K is normal and K over k is normal but L over k is not.
4. Find the splitting field over $\mathbb{Z}/7\mathbb{Z}$ for the polynomial $x^4 - 1$ over $\mathbb{Z}/7\mathbb{Z}$. Find the Gaoils group for this splitting field.
5. Repeat question (4) but for $x^3 - 2$ and the same field.