

MATH 210 PROBLEM SET 2

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This problem set is due on Friday, February 2 at Jarod Alper's office door.

1. Show that $\mathbb{Q}(\sqrt[3]{2})/\mathbb{Q}$ is not a normal extension.
2. Find the Galois group of the splitting field of $x^4 - 2$ over \mathbb{Q} . (Prior question: what is the degree of this extension?)
3. Make rigorous sense of the statement, and prove it: the algebraic closure of \mathbb{F}_p is $\cup \mathbb{F}_{p^n}$. (What does that last union even mean?) This field is sometimes called \mathbb{F}_{p^∞} .
4. Find the compositum of \mathbb{F}_{p^m} and \mathbb{F}_{p^n} in the algebraic closure of \mathbb{F}_p .
5. Find the sums of squares of the elements of \mathbb{F}_{p^n} . (The answer will depend on p^n .)

Date: Saturday, January 27, 2007.