Paper for Math 250, Fall 2006.

The aim of this homework is for you to read about and understand a small piece of mathematics, and then give an exposition of it. The most important aim is to convey your understanding of the subject in a precise way. Part of writing this paper will involve tracking down references in the library/internet, and another part will involve writing up what you have understood formally, and correctly typeset.

Your paper should be written in TeX or LaTeX, and be at least 5 pages and at most 8 pages in 11 or 12pt font. A possible break down is 1-2 pages on notation and background, 2-3 pages on the statement and proof of a theorem, and 1-2 pages working out the theorem or the proof carefully in an example.
Timeline:

1. Before November 25, please send me an email indicating your intention to write a paper and tell me a rough topic, which we will discuss.

2. By December 8, I expect a more precise description (e.g. "I intend to describe a proof of Theorem X") of what your paper will be about, including at least two references you intend to use.

3. In the last 1.5 weeks of class, each of you will give a short (10 min) presentation. These presentations can be (and are encouraged to be) done in groups. The presentations will not be evaluated.

4. The final paper is due before the end of reading period. It should be sent by email to me (`tfylam@math.harvard.edu`) and cc-ed to Thanos (`apap@fas`), preferably in postscript or pdf format.

If you intend to do the presentation in a group, please make sure your papers are on different aspects of the topic.

Possible topics.
I have mentioned some topics in class related to Galois theory which might be suitable. These include transcendental extensions, Kummer theory, the Kronecker-Weber theorem, or more on group and Galois cohomology. You may want to look at Tate's notes on Galois cohomology (`http://modular.fas.harvard.edu/Tables/Notes/tate-pcmi.html`) which were used in previous Math250 courses, for some other directions. If you already know some algebraic number theory and you are quite ambitious you may want to try understanding a chunk of class field theory.

In class, I will mention some possible topics in relation to representation theory. Some good topics include the Jacobson density theorem, and aspects of the representation theory of the symmetric group (or certain other groups). Chapters in the book *Representation theory of Finite groups and Associative algebras* by Curtis and Reiner (and the **harder** book *Methods of representation theory*) will contain many suitable topics.