General Information.

The time and location of the final exam are as follows:

- Date: Tuesday, December 13th
- Time: 1-4pm
- Location: Wean Hall 8201

The exam will cover Sections 4.4-4.5, as well as Chapters 5 and 6 of the lecture notes. The structure of the final exam will be similar to our previous exam: a true false section, a section of required problems, and a section of problems with some choice. You are allowed a full sheet of notes (front and back) and a calculator (I may ask you to do some small computations, but I'll bring extra calculators if you don't have one). I suggest reviewing homework, problems I did not assign from the lecture notes, and some of the examples and simpler proofs from the lecture notes.

Topics.

Here is a list of keywords to help you study.

Chapter 4:

- p-adic integers and p-adic number numbers (just some comfort with basic definitions)
- Hensel's lemma (simple examples like Example 4.20)
- Solving Diophantine equations with unique factorization.

Chapter 5:

- Basics
  - algebraic numbers and integers
  - transcendental numbers
  - minimal polynomials
  - conjugates and embeddings
  - norm (of an element and of an ideal)
  - trace
  - orders
  - discriminant (of a set, an ideal, an order, and a number field)
- Finding rings of integers by discriminant and index considerations
- Irreducible and prime elements
- Failure of unique factorization of elements in rings of integers
- Unique factorization of ideals in rings of integers
- The class group
- Lattices
  - Definition

  - Fundamental domains
  - Determinants/covolumes
- Minkowski's convex body theorem and applications
- The lattice $\Lambda_{\mathfrak{a}}$ associated with an ideal $\mathfrak{a}$ in $\mathcal{O}_K$.

Chapter 6:

- Solving Mordell equations (and possibly other Diophantine equations) with the class group
- Cyclotomic fields (basic definition, what they have to do with Fermat's last theorem)