Format and topics for final exam
Math 126

General information. The final will be about twice as long as our in-class exams, with 135 minutes in which to complete it. It will take place in our usual room.

The final will be cumulative; in other words, the final will cover the topics on this sheet and also on the previous three review sheets. However, the exam will somehwat emphasize the material listed here (Chapters 24 and 25, plus handouts on Gauss' Lemma and the Jacobi symbol). As always, most of the exam will rely on understanding the problem sets (including the problems to be done but not written up or turned in) and the definitions and theorems that lie behind them. If you can do all of the homework, and you know and understand all of the definitions and the statements of all of the theorems we've studied, you should be in good shape. You should not spend time memorizing proofs of theorems from the book, though understanding those proofs does help you understand the theorems. On the other hand, you should defintely spend time memorizing the *statements* of the important theorems in the text.

The usual ground rules apply: No books or notes allowed, and four types of questions, namely, computations, statements of definitions and theorems, proofs, and true/false with justification.

Definitions. The most important definitions we have covered are:

Ch. 24 Jacobi symbol $\left(\frac{a}{b}\right)$

Theorems, results, algorithms. The most important theorems, results, and algorithms we have covered are listed below. You should understand all of these results, and you should be able to state any theorem clearly and precisely. You don't have to memorize theorems by number or page number; however, you should be able to state a theorem, given a reasonable identification of the theorem (either a name or a vague description).

Ch. 24: Law of Quadratic Reciprocity (especially part III); Generalized Law of Quadratic Reciprocity. Computing Legendre symbols: Method using factoring, method using Jacobi symbols.
Ch. 25: Sum of Two Squares Theorem. Fermat descent procedure.
$(u^2+v^2)(A^2+B^2) = (uA+vB)^2 + (vA-uB)^2$.

Examples. You will also need to be familiar with the key properties of the main examples we have discussed. Most of the important examples we have encountered have appeared in the assigned problems. In addition, you should also know:

Ch. 24: Examples of computing $\left(\frac{a}{p}\right)$.
Ch. 25: Examples of solving $p = a^2 + b^2$.

Not on exam. Ch. 25: Sums of squares and complex numbers.
Good luck.