

Some general comments: we have covered a lot of material, and you have done a lot of homework problems. I think you are all pretty well prepared for the comprehensive exams over 520.

The final will have 50 points on groups (Chap 2) and 150 points on fields and Galois theory (Chap 3, 4).

Here's my list of exclusions on the proofs.

3.1–3.2 This was a review of 421; read it again, but I don't expect to ask questions from it.

3.3–3.5 You need to know all of this material. I won't ask for the proofs of Lemmas 3.4.3 and 3.4.4 on extending automorphisms, although the idea is central.

4.1 You can omit the proof of Lemma 4.1.5; know everything else.

4.2 This isn't so central; know the statements; I won't ask the proof of the primitive element theorem.

4.3 This section is really important. You should study it thoroughly; you can omit the proofs of Artin's lemma and the Fundamental Theorem of Algebra.

4.4 The statements are important, and provide some good results for actually calculating Galois groups. I won't hold you responsible for the proofs of 4.4.4 - 4.4.6.

Finally, there are some additional techniques for computing Galois groups in Section 4.6. The material in Section 4.5 on cyclotomic polynomials (which involves factoring  $x^n - 1$ ) might make interesting reading over the holidays. Dummit and Foote has a lot of examples, and some useful ways to compute Galois groups. It is a good resource, but I really think you already know enough about the computations to cover any questions that might be asked by our department.

I hope you have appreciated the beautiful way everything fits together to answer what is really a high school algebra question: are there more formulas like the quadratic formula, that allow you to find the roots of higher degree polynomials?