

Math 250A: Reading and Concepts for 11/9-11/19

General reading note: This is the final section of our course: modules and category theory. As with Galois theory, I will not assume you know any of the terminology. It might be a good idea to review what Noetherian rings are. Our main task in these lectures will be to prove what is in section III.7 of Lang.

The lectures this week will be planned roughly as follows:

- 11/9: Modules continued: submodules, quotient modules, direct sums of modules, torsion modules. Reading: III.1, III.3, a little of III.7 of Lang. Concepts you should know: definition of an R -module and module homomorphisms. Look over the module isomorphism theorems on page 120 of Lang.
- 11/12: Veterans Day (no class).
- 11/14: Noetherian modules, cyclic modules, and beginning discussion of finitely generated torsion modules over a PID. Reading: Basically the relevant section is III.7 of Lang. He avoids alluding to Noetherian modules by that name (except in a quick comment after one of the proofs), but the proofs will be more lucid if we introduce these.
- 11/16: Finitely generated torsion modules over a PID. Reading: III.7 of Lang: note we are not dealing with free modules yet. In terms of finitely generated abelian groups, this is the analog of proving the fundamental theorem with respect to finite abelian groups.
- 11/19: Free modules, beginning general finitely generated modules over a PID. Reading: III.7 of Lang: now we are adding free modules into the mix with torsion modules. In the language of finitely generated abelian groups, we are now considering infinite finitely generated abelian groups as well as finite ones.