

The problems will be derived from sections 13-15.

Exam advice

Expect about four questions with parts.

1. **Definitions.** You should be able to define homomorphism of groups, Kernel of a homomorphism, image of a homomorphism, cosets of a subgroup, factor (or quotient) group G/H , normal subgroup, simple group, abelian group, non abelian group, sign of a permutation, commutator subgroup.

Moreover, you should be able to verify if the definition holds or fails for a given example.

You should also be able to produce your own examples for the given definition.

2. **Problems** Be sure to review the problems discussed in class from sections 13, 14, 15. Be sure to study nearby problems, especially the ones which give a general technique.
3. **Techniques** Be sure to review the technique of quick conjugation and commutator in groups. Pay special attention to permutation groups.

Sec. 13

- (a) Practice computations of Kernel (e.g. sec13 16-27. Also review sec.13 28, 29.)
- (b) Review sec. 13 33-42 where you are asked to construct a nontrivial homomorphism between given groups, when possible.
- (c) Review sec. 33 50,52,55.

Sec. 14

- (a) Study how to determine the orders of factor groups (by determining Kernels). Be sure to set up general formulas rather than analyzing each element by hand. (sec. 14 1-16).
- (b) Also study the assigned problems sec. 14 22,23.
- (c) Study the concepts of a commutator $[g, h] = ghg^{-1}h^{-1}$, and its uses. Study the definition of a normal subgroup, especially its meaning of staying invariant under all conjugations. Sample problems are between sec. 14 24-41.

Sec. 15

- (a) Study the assigned problems between 13 and 35.
- (b) Be sure to study the theory problems completely (except prob. 39 which will be discussed in class).