

The midterm will cover the following sections of the text book:

Sections 7.1 - 7.10 – Groups

The mid-term will be 50 minutes. You will not be allowed to use a calculator. You will also not be allowed to bring in any notes. Below are a list of the definitions and theorems you should know.

**Definitions and terms.** You will need to know the definitions of the following terms and know examples of each term:

a permutation of a set, group, identity element, inverse, abelian, finite order, order of a group, order of an element, infinite order, subgroup, center, cyclic group, generators of a group, isomorphic, isomorphism, homomorphism, automorphism, image of a function,  $a$  is congruent to  $b$  modulo  $K$ , congruence class, index, normal subgroups, left coset, right coset, quotient group, kernel, simple group,  $k$ -cycle, transposition, even permutation, odd permutation, alternating group

**Theorems.** You will need to know the statements of the following theorems, and how to apply them:

Theorem 7.1, Theorem 7.2, Theorem 7.5, Theorem 7.8, Theorem 7.10, Theorem 7.12, Theorem 7.14, Theorem 7.15, Theorem 7.17, Theorem 7.18, Theorem 7.19, Theorem 7.20, Theorem 7.22, Theorem 7.23, Theorem 7.26, Theorem 7.28, Theorem 7.33, Theorem 7.34, Theorem 7.36, Theorem 7.38, Theorem 7.39, Theorem 7.40, Theorem 7.42, Theorem 7.43, Theorem 7.44, Theorem 7.45, Theorem 7.47, Theorem 7.50, Theorem 7.51, Theorem 7.52.

I will also ask you to prove one of the following theorems:

Theorem 7.5, Theorem 7.13, Theorem 7.33, Theorem 7.39

The exam will be based on the material above. The exam will have the following form:

- (i) write out a definition or the statement of a theorem, as well as give an example. [10 pts]
- (ii) apply the theory and definitions to calculate some examples. For example, I may give you a group, and ask you if a specific subgroup is normal. [10 pts]
- (iii) there will be five other problems given, of which you will have to do three. These problems will be either new, unseen problem or involve writing out a proof to one of the theorems listed above. [15 pts] (5 pts for each question).