

FINAL EXAM INFORMATION MATH 2231  
Wednesday, Dec 15, 2010 at 9:00 AM in ATAC 2019

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The final exam will cover the following sections of the text book:

- Chapter 0 – (should know this, but won't be tested directly)
- Chapter 1
- Chapter 2
- Chapter 3
- Chapter 4 – pages 72-77 (skip the section on classification)
- Chapter 5
- Chapter 6 – pages 122-129 (skip inner and outer automorphisms)
- Chapter 7 – pages 138-144 (skip stabilizer and orbits)
- Chapter 9 – pages 178-188 (skip internal direct products)
- Chapter 10
- Chapter 12
- Chapter 13
- Chapter 14
- Chapter 15 – pages 280-285 (skip Field of Quotients)
- Chapter 16

The final exam will be 3 hours. You will not be allowed to use a calculator or bring in any notes. Below is 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:

equivalence relation, partition, function, one-to-one, onto, group, dihedral group, binary operation, abelian group, group of integers modulo  $n$ , general linear group, special linear group,  $U(n)$  (multiplication mod  $n$ ), identity, inverse, order of a group, order of an element, subgroup, trivial subgroup, cyclic group, center of a group, centralizer of an element, generator, permutation, cycle of length  $n$ , even and odd permutation, alternating group, isomorphism, cosets, index, normal subgroup, factor group, group homomorphism, kernel, ring, commutative ring, unity (identity), unit, subring, zero-divisor, integral domain, field, characteristic of a ring, ideal, principal ideal, factor ring, prime ideal, maximal ideal, ring homomorphism, kernel, natural homomorphism, ring of polynomials, degree of a polynomial, leading coefficient, principal ideal domain.

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

Theorems 0.1 (The Division Algorithm) and 0.2, Theorems 2.1, 2.2, 2.3, and 2.4, Theorems 3.2, 3.4, 3.5, and 3.6, Theorem 4.1, and its Corollary 1 and 2, Theorem 4.2 and its four corollaries, Corollary 4 of Theorem 4.2, Theorems 5.1, 5.2, 5.3, 5.4, 5.5, and 5.6, Theorems 6.1, 6.2, and 6.3, Lemma on page 139, Theorem 7.1 and its Corollaries 1, 2, 3, 4 and 5. Theorems 9.1, 9.2, 9.3, and 9.5, Theorem 10.1, 10.2 and its Corollary, Theorem 10.3 and its Corollary, Theorem 10.4, Theorems 12.1, 12.2, and 12.3, Theorems 13.1, 13.2 and its Corollary, 13.3, and 13.4, Theorems 14.1, 14.2, 14.3, and 14.4, Theorems 15.1, 15.2, 15.3, 15.4, and 15.5, Theorems 16.1, 16.2, and its three Corollaries, 16.3, and 16.4.

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

Theorem 10.1(4), 13.2, or 14.3.

Because you had no homework questions from Chapter 16, I will also ask you to answer one of the following questions:

Chapter 16: 11, 17, 30

**Exam Format.** The exam will be based on the above material. The questions will have the following format:

- (1) **[30pts]** These questions will ask you to write out a definition, give an example, or apply a theorem. Some of these questions will involve calculations.
- (2) **[30pts]** There will be 10 proof questions, of which you will have to prove 6. Eight of the questions will be new, unseen problems. In addition, one question will ask you to prove one of the theorems given above, and one will ask you to answer one of the questions from Chapter 16.