The final exam will only cover Chapters 7 and 8 of *Abstract Algebra: an Introduction*, by T. Hungerford. The exam will take place on:

April 21, 2008 at 1:00PM in RC 0005

The exam will be 3 hours. You will not be allowed to use a calculator or any notes. Below are a list of the definitions and theorems that you will be tested on.

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

> 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, the kernel of a homomorphism, simple group, k-cycle, disjoint cycle, transposition, even and odd permutations, alternating group, direct product, direct sum, direct factor, p-group, element of maximal order, invariant factors, elementary divisors, Sylow p-subgroups, conjugate, centralizer, class equation, A is H-conjugate to B, normalizer, symmetry, dihedral group of degree n.

Theorems. You need to know the following theorems, and how to apply them:

> Theorem 7.1, Theorem 7.2, Theorem 7.4, 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 7.42 (First Isomorphism Theorem), Theorem 7.43 (Third Isomorphism Theorem), Theorem 7.44, Theorem 7.45, Theorem 7.46, Corollary 7.48, Theorem 7.50, Theorem 7.51, Theorem 8.1, Theorem 8.3, Theorem 8.5, Theorem 8.7 (The Fundamental Theorem of Finite Abelian Groups), Theorem 8.9, Theorem 8.10, Theorem 8.13 (First Sylow Theorem), Corollary 8.14, Theorem 8.15 (Second Sylow Theorem), Corollary 8.16, Theorem 8.17 (Third Sylow Theorem), Corollary 8.18, Theorem 8.20, Theorem 8.21, Theorem 8.24, Theorem 8.27, Theorem 8.30, Theorem 8.32, Theorem 8.33.

Besides the above results, I will also ask you to prove one or more of the following results:

> Theorem 7.5, Theorem 7.37, Theorem 7.39, Lemma 8.2, Lemma 8.8, Theorem 8.20

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

(i) [**10 pts**] Write out a definition of a term and give an example of that term.

(ii) [**10 pts**] You will be given 5 false statements. For each statement, you will have to give an example to show it is false.

(iii) [**10 pts**] 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.

(iii) [**30 pts**] There will be ten other problems given, of which you will have to do six. These problems will be either new, unseen problem, or involve writing out a proof to one or more of the theorems listed above. (5 pts for each question).