The final exam for this course is scheduled for Thursday, December 15, from 1:30 to 4:30 PM. The exam will be in our regular classroom.

The exam will be in two parts. The first part is closed book and will consist of definitions, statements of theorems, computations, and perhaps one or two very simple proofs. After you turn in the first part, you will receive the second part of the test, which will consist of longer proofs and perhaps one or two essay questions. During the second part of the exam, you can use your textbook and your notes from the course.

The final exam is cumulative. You are responsible for all the material that was covered on the three in-class tests, plus the few things that we have covered from Chapters 13 and 14 since the third test. You should look over the review sheets for the three tests; if you have lost your copies, you can still get them on-line.

Here are my office hours for exam week:

Monday, December 12:	11:00–12:00 and 1:30–3:00
Tuesday, December 13:	11:00–2:00
Wednesday, December 14:	11:00–3:00
Thursday, December 15:	12:00–1:20

Here are some of the things that we have covered since the third test:

Caley's Theorem.

The Second Isomorphism Theorem.

If N and K are normal subgroups of G, $N \cap K = \{e\}$, and $NK = G$, then $G \cong N \times K$.

Fundamental Theorem of Finite Abelian Groups.

Finding all abelian groups of a given order, up to isomorphism.

If G is a finite abelian group and $|G| = p_1^{n_1} p_2^{n_2} \cdots p_k^{n_k}$ where p_i are distinct primes, then

$$G \cong G_1 \times G_2 \times \cdots G_k \text{ where } G_k = \{x \in G \,|\, x^{p_i^{n_i}} = e\}.$$

Finitely generated abelian group.

Here are some of the important topics from the rest of the course:

Definitions and basic properties of groups.

Additive *vs.* multiplicative groups and the differences of notation between them.

Facts about the integers, including properties of the greatest common divisor.

Symmetry and the relationship between group theory and symmetries of geometric objects.

The groups D_n, their properties, and their definitions as groups of symmetries.

Matrix groups $\mathrm{GL}(n, \mathbb{R})$ and their subgroups.

Other common number groups, such as $(\mathbb{Q}, +)$, $(\mathbb{R}, +)$, $(\mathbb{R}^+, \cdot)$, $(\mathbb{C}, +)$, and $(\mathbb{C}^*, \cdot)$.

Cyclic groups; generator of a cyclic group; order of a group element.

The cyclic groups $\mathbb{Z}$ and $\mathbb{Z}_n$.

Subgroups; subgroups of cyclic groups; the subgroup $Z(G)$.

Permutations and the symmetric groups S_X for a set X and S_n for $n \in \mathbb{Z}^+$.

Working with the tableau representation of permutations.

Cycles; permutations as products of disjoint cycles; order of a permutation.

Even and odd permutations; the alternating group A_n.

Cosets.

Lagrange's Theorem and its corollaries.

Normal subgroups and quotient groups.

Homomorphisms and isomorphisms and their properties.

The groups $\mathrm{Aut}(G)$ and $\mathrm{Inn}(G)$.

The kernel of a homomorphism.

The relationship among homomorphisms, kernels, and quotient groups (First Isomorphism Theorem).