

Math 434 Midterm: Topic Review

Here is a list of the major topics we have covered so far this semester.

Rubik's Cube

I will not ask any specific questions about Rubik's cube.

Group Theory

- Generalized Cayley Theorem
 1. Index theorem (corollary) applications to existence of normal subgroups.
- Counting
 1. Burnside's Theorem
- Proofs of Group Isomorphism Theorems (these get a heavy workout later)
 1. First, Second, Third Isomorphism Theorems
 2. Correspondence Theorem
- Classification of Finite Abelian Groups.
 1. Still not completely proven
 2. Should be able to deduce and use the possible abelian groups of any order
 - (a) For a simple example: $|G| = 2^3 \cdot 7$ and G abelian implies G is one of the following:
 - i. $Z_2 \times Z_2 \times Z_2 \times Z_7$
 - ii. $Z_4 \times Z_2 \times Z_7$
 - iii. $Z_8 \times Z_7$

Ring Theory

- Peano Axioms about \mathbf{Z}
- Homomorphisms and Ideals
- Quotient Rings
- Adjunction of Elements
- Fraction Fields obtained from Integral Domains
- Link between Maximal ideals and Fields
- Factoring in:

1. \mathbf{Z} , $\mathbf{F}[x]$, $\mathbf{Z}[i]$
2. Unique Factorization Domains
3. Principle Ideal Domains
4. Euclidean Domains