Comprehensive Examination Syllabus
Varieties of Algebras and Equaitonal Logic
MATH 748V and MATH 768E
August 2008

This comprehensive examination will cover the material in the chapters and sections of the books listed below.

- Algebras, Lattices, Varieties by McKenzie, McNulty, and Taylor
  - Chapter 1: Basic Concepts
  - Chapter 4: Fundamental Algebraic Results (Except §4.8)

- A Course in Universal Algebra by Burris and Sankapannavar
  - Chapter II: The Elements of Universal Algebra (Except §§4 and 14)
  - Chapter IV §6: Ultraproducts and Congruence Distributive Varieties.

- The Commutator in Congruence Modular Varieties by Freese and McKenzie
  - Chapter 1: The Commutator in Groups and Rings
  - Chapter 2: Universal Aglebra
  - Chapter 3: Several Commutators
  - Chapter 4: One Commutator in Modular Varieties; Its Basic Properties
  - Chapter 5: The Fundamental Theorem of Abelian Algebras
  - Chapter 6: Permutability and a Characterization of Modular Varieties
  - Chapter 7: The Center and Nilpotent Algebras
  - Chapter 10 §3: Residually Small Varieties

- Universal Algebra by Jaroslav Ježek
  - Chapter 3: Structures and Algebras (except §§7–9)
  - Chapter 6: Varieties (§§1–7)
  - Chapter 7: Mal'cev Type Theorems
  - Chapter 9: Commutator Theory and Abelian Algebras
  - Chapter 12: Algorithms in Universal Algebra

- Residual finiteness and finite equational bases: undecidable properties of finite algebras These are lecture notes on some work of Ralph McKenzie and Ross Willard.
- Class Notes from MATH 768E

This looks like a lot, but there is considerable overlap among these four books and the sets of lecture notes. MATH 748V was based on the material in Chapters 1 and 4 of the McKenzie, McNulty, Taylor book and on the material in the Freese and McKenzie book on the Commutator in Congruence Modular Varieties. The book by Burris and Sankappanavar gives another presentation of a lot of the material in MATH 748V. All these books have exercise sets to help you prepare for the comprehensive examination. The Commutator book even provides detailed solutions for its exercises (but try your hand first). The new book by Ježek covers the material in MATH 748V as well as some of the material from MATH 768E and some additional topics. It has no exercises.

Some Advice:

(1) The most important thing is to know the definitions of the key concepts.
(2) The next most important thing is to know some informative examples.
(3) After that, know the fundamental facts and principles that get used over and over.
(4) After that, know the big theorems.
(5) After that, learn some of the proofs.

While I will be gone from 3 July to 20 July, other times I will be around the Department. You are more than welcome to drop by and discuss things. I can also be reached by email most of the time.

George F. McNulty