CSCI 340 (Computational Models)
Review Sheet for Exam 3

This is intended as a guideline for studying for the third exam… but only as a guideline! I wouldn't have covered something if I didn't think it was important. If you are wondering about a topic and you don't see it here, ask me!

Sample Types of Questions

- Short answer, multiple choice and true/false (expect MORE of these!)
- Trace the path by which input can be accepted by a TM using an execution chain
- Descriptions of languages defined by TMs or Post Machines
- Given a language description, create a TM to accept it
- Given a language description, create a PM to accept it

Chapter 16 (Non-Context-Free Languages)

- Basic properties of non-context-free languages
- Concept of pumping lemma for CFLs

Chapter 17 (Context-Free Languages)

- Closure properties

Chapter 18 (Decidability for CFLs)

- Definitions, terminology and methodology
- Which questions are decidable

Chapter 19 (Turing Machines)

- Definitions, terminology
- Execution train or trace
- Relationship to regular languages
- ACCEPT, REJECT, LOOP
- Insert, Delete subprograms

Chapter 20 (Post Machines)

- Definition
- Differences from the TM
- Expressive equivalence with TM

Chapter 21 (Minsky's Theorem)

- Two-stack PDA
- Equivalence with TM
- NPDAs and equivalence

Chapter 22 (Variations on TM)

- Examples and definitions
- Stay-Option, Multi-tape, 2-way infinite tape, etc.
- Variations' equivalence with TM and justifications

Chapter 23 (TM Languages)

- Recursive vs. recursively enumerable
- Closure and relationships under complementation, intersection, union, etc.
- Encoding of TMs (CWL)
- Non-recursively enumerable languages (ALAN)
- Universal Turing Machine
- Halting problem
- Decidability questions (membership, lambda, emptiness, finiteness…)

Chapter 24 (Chomsky Hierarchy)

- Phrase-Structure Grammars
- Type 0 Grammars

- The Chomsky Hierarchy
- Context-Sensitive Grammars and possible correspondence to natural languages

Chapter 25 (Computers)

- Definition of a Computer
- Church’s Thesis