

CS481F01 Final Study Notes

December 14, 2001

The Exam is scheduled for Tues, 18 Dec, 12:00-2:30 in PH 403.

As usual, the Exam is open book, open notes.

I am hoping it should take about 90 minutes, but you have the full 150 minutes if you want it.

You will be asked for proofs (or “justifications”). As usual for a time-limited exam, these can be somewhat informal. You may rely heavily on Church’s Thesis. In particular, I am not looking for complete definitions of state transition functions, or proofs by induction on the number of steps in a computation, or other highly technical arguments. Your descriptions should be clear and should convince the grader you know what you’re talking about.

The Exam is cumulative, but will emphasize material from the last third of the course, which has not been covered on a Prelim.

Material explicitly *not* covered:

- Type 0 and Type 1 Chomsky Grammars
- Chomsky-Schutzenberger Theorem
- Parsing, Younger’s Algorithm
- Other machine models (2-stack, 4-counter, 2-counter, queue) Godel’s Theorem

Material you should be (especially) comfortable with:

- Sets that are regular, context-free, co-context-free, recursive, r.e. (but not recursive), co-r.e. and above. We have given examples in each of these categories; it will help to be familiar with them.

- Use of the Pumping Lemma (regular and context-free variants).

Turing Machine based undecidability proofs by diagonalization, reduction, and Rice's Theorem. Use of $\text{ValComps}_{M,x}$ in undecidability proofs.

Decidability of problems about regular and context-free languages. For example, we gave decidability proofs (emptiness and finiteness of CFLs) and undecidability proofs (emptiness of intersection or complement of CFLs). You should feel comfortable making similar arguments about regular sets, or combinations of regular and context-free sets.

Structure of the Arithmetic Hierarchy.

Good Luck!