

CS 81 Final Review Topics

The final will be in two parts, in this order:

1. Part 1 will ask about concepts and definitions. The problems to be solved, if any, will be relatively straightforward. This part is to be done without reference to any materials.
2. Part 2 can be started as soon as you have turned in Part 1. It will consist of problems and perhaps deeper questions. For this part, you may use as your only resource a crib sheet: one sheet of paper, double-sided, with contents of your own construction. Turn in your sheet with the exam.

The approximate division of points will be 25% for part 1 and 75% for part 2.

Terms and concepts to review:

Pre-Midterm Concepts	
Propositional connectives	Soundness
Sequents	Completeness
Natural deduction proof rules for propositional logic	Quantifiers
Intuitionistic rules	Equality rules
Reductio ad absurdum, modus ponens, modus tollens	Structural induction
Law of the Excluded Middle	Interpretation
Syntax vs. semantics	Model
Mathematical induction	Validity
Strong form of mathematical induction	Counter-model
Tautology	Number theory axioms
Satisfiability for propositional logic	Group axioms
Truth table	Weaker vs. stronger formulas
Quine's method (or Boole/Shannon method)	Satisfiability for predicate logic
Tree method for propositional logic	Tree method for predicate logic
Natural deduction proof rules for predicate logic	Hoare triples method
	Invariant
Post-Midterm Concepts	
Proof by resolution for propositional logic	Recursive set/language
Unification	Recursively-enumerable set/language
Proof by resolution for predicate logic	Dove-tailing
Conversion to prenex and clause form	Rice's theorem (including how to prove it)
Skolem functions	Non-deterministic machines
Logic representation of states and transitions	Language operators (concatenation, *)
Answer extraction in resolution	Grammars
Countability	Derivation sequences and trees
Turing machine	Chomsky hierarchy
Church/Turing thesis	Regular languages
Universal Turing machine, encodings	Pumping lemma for regular languages
Uncomputable/unsolvable/undecidable	Abstract states of a language
Undecidability of Predicate Calculus	Myhill-Nerode equivalence
Divergence and halting problems	Myhill-Nerode theorem
Reducibility	Conversion between regular expressions and finite-state machines
Blank-tape halting and other variants	Closure properties of regular languages
Primitive-Recursive Function	Pushdown acceptors
Partial-Recursive Function	