CSE 321
Discrete Structures
Final Exam Topic List

Spring 2009 W. L. Ruzzo

You may bring one sheet of notes (both sides, handwritten, 8.5 x 11, no magnifying glasses, e-paper, microfilm,...)

The final is comprehensive, but with a slight emphasis on topics covered since the midterm.

The midterm covered chapters 1, 2 and 4, except 4.5, e.g.:

Logic propositions, $\vee, \wedge, \neg, \rightarrow, \leftrightarrow$, tautology, satisfiability, contingency, converse, contrapositive, truth tables, logical equivalences, quantifiers, nesting, scope, free/bound variables. Proofs: vacuous, trivial, direct, contradiction, counterexample. Know the various laws, e.g. Table 6 in Sect 1.2, and know the *names* for associative, commutative, distributive and DeMorgan. Ditto for the analogous Table 1 in 2.2. Know the rules in Tables 1 & 2 in 1.5, and the names for "modus ponens" and "resolution."

Sets $U, \cap, \cup, \in, \subseteq, \emptyset$,complement, DeMorgan, $A \times B$, cardinality, countable, denumerable, enumerable, enumeration, uncountable, diagonalization.

Functions domain, co-domain, range, image, pre-image, composition, in-, sur-, bi-jection, 1-1, onto, inverse. In table 2 of 2.4, the 2nd and 5th summations are particularly useful - memorize them.

Induction plain, strong, structural. Recursive definitions and algorithms.

Since the midterm, we've covered sections 3.4–3.7, 5.1-5.3; 5.4 through Cor. 1, and Chapter 6, e.g.:

Number Theory primes, prime decomposition, gcd, relatively prime, extended gcd ($as+tb = \gcd(a,b)\ldots$), Euclidean algorithm, modular arithmetic, Chinese remainder theorem, modular exponentiation, Fermat's little theorem, RSA, primality testing, pseudo-random generators.

Counting Sum and Product rules, inclusion/exclusion, tree diagrams, permutations and combinations, binomial theorem, pigeon hole principle.

Probability Sample space, conditional probability, independence, Bernoulli trials, law of total probability, Bayes theorem, random variables, expectation, variance, linearity of expectation, inversions, average case analysis of insertion sort. Independent random variables; linearity of variance for *independent* random variables (but not in general). Distributions: uniform, nonuniform, binomial, geometric.

The List of Symbols inside the covers of the textbook is also a useful review.