

Final Exam Preparation
CS 336, Tandy Warnow

The final exam will cover all the material that we discussed in the course. You should focus on problems from the quizzes and homeworks, as the final is likely to have similar problems. All the quizzes and homeworks are on the course website. The specific topics we covered are given below.

Reading and writing mathematics You should know how to define sets, functions, and graphs, and express properties using quantifiers.

Induction proofs Be able to prove mathematical formulas (equalities and inequalities, for example) by induction. Be able to do proofs using strong induction. Be able to do proofs by induction to establish theorems about functions of two or more variables.

Other proof techniques In particular, you should be able to do proofs by contradiction. Recall the proof that $\sqrt{2}$ is not rational, and that there are an infinite number of primes.

Solving recurrence relations Be able to find closed form solutions to recursively defined functions, and prove the closed forms correct by induction. Be able to find upper and/or lower bounds (in closed form) for recursively defined functions.

Dynamic programming Remember the DP algorithms for:

- All-pairs shortest path
- The rock game(s)
- Longest increasing subsequence

For each of these algorithms, be able to apply the algorithm to a given input. Also, be able to develop a new DP algorithm for a new problem, if given the subproblem formulation.

Big-oh Be able to define what it means for a function to be big-oh of another function. Be able to answer whether function $f(n)$ is big-oh of function $g(n)$. Be able to prove that $f(n)$ is big-oh of $g(n)$. Remember the basic techniques! For example, the computation of $\lim_{n \rightarrow \infty} \frac{f(n)}{g(n)}$.

Counting Remember all the techniques!! Be able to apply them to do combinatorial counting, sometimes using more than one technique.

Proving programs correct Make sure you know the definition of a loop invariant, and of partial correctness.