

List of topics for the Final Exam

Topics: The list of topics for Exam #2 includes all covered sections of Chapters 7, 6, and 5.

Chapters 1, 2, 3, and 4

You should quickly review Chapters 1, 2, 3, and 4, at least go through the lecture notes carefully. Refer to the list of topics for Exam #1 and Exam #2 for details. Don't forget to review section 4.4 (recursive algorithms) because it is important for Chapter 7.

Chapter 7: Recurrence relations

Review all covered sections of Chapter 7 in depth:

- > **7.1** Introduction. Definition of a recurrence relation. Examples. Geometric and Arithmetic sequences. Example: investing at a fixed interest rate.
- > **7.2** Solving recurrence relation. Examples. Proving a solving formula by induction. Solving arithmetic and geometric sequences.
- > **7.3** Applications to the Analysis of Algorithms. Computing the complexity of an recursive algorithm. Examples.

Chapter 6: Counting methods

Review all covered sections of Chapter 6 in depth:

- > **6.1** Basics. Additive principle, Multiplicative principle, Inclusion-Exclusion principle, Bijective principle. Counting integers.
- > **6.2** Permutations and Combinations. Definition and characterizations. Examples.
- > **6.7** Binomial coefficients and combinatorial identities. Pascal's triangle. Combinatorial identities. The binomial theorem.
- > **6.8** The pigeonhole principle. Variations. Examples.

Chapter 5: Number theory

Review all covered sections of Chapter 5 in depth:

- > **5.1** Divisors. Prime test. Fundamental theorem of arithmetics. Greatest Common Divisor and Lowest Common Multiple.
- > **5.2** Representation of integers. Expressing integers in any base. Algorithms. Binary and hexadecimal numbers.

Review material:

- > **Lecture notes** and supporting **textbook**.
- > **Homework exercises:** refer to the online course schedule for the homework assignments corresponding to the topics in the list of topics.
- > **Quizzes:** Quizzes 7, 8, 9. Refer to the course schedule for the past quizzes and their solutions. Make sure you read all the solutions carefully.

General advice

- Your lecture notes from class should be your primary source of information. You are expected to know all the material in your lecture notes, and no other. Review your lecture notes regularly and thoroughly.
- Remember that all past quizzes, tests and homework exercises are available on the course web page. Make sure you go over all of them (or as many as you can).
- It is of the utmost importance that you work hard on your homework problems: do as many exercises as possible, and as seriously as possible. Just finding the correct answer is not sufficient: you need to understand why it is correct and you need to be able to write the proper justifications.
- I am happy to answer your questions, as long as: 1. They are mathematical questions, and 2. You have made a genuine effort to think about your question before contacting me.
- The best way to prepare for the exams is to work regularly: make sure you understand all the material as it is being taught, do many homework exercises, etc. Don't wait until the last moment to prepare. Don't try to guess what will be on the test, your time is best spent preparing for every possibility.
- Do not expect the test to be solely a direct application of the material you reviewed. It will require you to be capable of original thinking.
- Calculators will not be allowed, nor any other resources.