Algorithm Design and Analysis September 24, 2007
Pennsylvania State University CSE 565
Professors Sofya Raskhodnikova

Exam 1 Announcement

When: Friday, September 28, 2007, 8:15 P.M.10:15 P.M. Please show up a few minutes early so that you can take advantage of the full time available.

Where: Willard 158.

Crib sheet: The exam is *closed book*. You may, however, bring one *handwritten* crib sheet on an $8\frac{1}{2} \times 11$ or A4 *colored* sheet of paper. The color of the paper has to be significantly different from white. Preparing a crib sheet can be a useful study aid, so take time in selecting material for it. You may use both sides of the paper and write as small as you like, but you are allowed only one sheet and it must be handwritten. Calculators and programmable devices are not allowed for this exam.

Material covered: You are responsible for all material covered in the lectures and reading assignments through the lecture on Friday, September 21, and homework 1–4, excluding Master Theorem. The course home pages has a record of the material covered in lectures and reading assignments.

Exam review: Lecture held on Monday, September 24 will be devoted to review for the exam. Please come prepared with questions.

Practicing for the exam: The exam will be in the format similar to practice exam for CSE 465 in the spring of 2007, but the material covered will only partially overlap:
http://www.cse.psu.edu/ãsmith/cse465/S07/handouts/practiceexam1.pdf
From that exam, you should be able to answer questions 1, 2a-d (using recursion tree method), 3 (first and third) and 5. You should make sure you know how to solve all homework exercises (that you did not have to hand in) and problems, all solved exercises in the book in the assigned chapters, and all review questions from the lectures. If you need more problems to practice on, please look at the problems and exercises in the chapters we covered.

Skills:

- You should be familiar with asymptotic notation, be able to arrange functions in order of asymptotic growth and apply the definitions of O, Ω, Θ-notation.
- For algorithms we studied, you should know how each algorithm works, its (worst case) running time and space complexity, and how to prove its correctness. You should understand and be able to adapt the above algorithms (e.g., BFS) and subroutines we developed while building them (e.g., merging sorted arrays).
- You should be able to use Greedy strategy to **design new algorithms**. You should be able to prove that your algorithms are correct and analyze their running time and space complexity.

- You should be familiar with Divide-and-Conquer strategy. Given a Divide-and-Conquer algorithm, you should be able to come up with a recurrence for its running time and be able to solve it using the recursion tree method, and express your answer using asymptotic notation.
- You should understand pseudocode used in CLRS (see the handout posted on Angel) and be able to describe your algorithms both in English and using pseudocode (your pseudocode does not have to be the same as in the handout). Your algorithms should have clearly marked input, output, data structures and detailed unambiguous implementation of every step. Use comments to make your pseudocode easily readable.
- Some questions will require you to be comfortable with material covered in the mathematical prerequisites. For example: arithmetic and geometric sums, logarithms and exponents.