

Problem Set #3

Instructor: Anna Karlin

Due on **October 20, 2011**.

Instructions: You are allowed to brainstorm on ideas for solving these problems with fellow students taking the class. You may also collaborate with at most one other classmate on writing up your solutions. If you do collaborate in any way, you must acknowledge for each problem the people you worked with on that problem. Please do not post solution ideas to discussion boards – discussion boards can be used to clarify the problems and perhaps to discuss specific examples. People shouldn't be able to find solutions (even partial solutions) to the problems on the discussion board.

The problems have been carefully chosen for their pedagogical value and hence might be similar or identical to those given out in past offerings of this course at UW, or similar courses at other schools. Using any pre-existing solutions from these sources, from the Web or other algorithms textbooks constitutes a violation of the academic integrity expected of you and is strictly prohibited.

Most of the problems require only one or two key ideas for their solution – spelling out these ideas should give you most of the credit for the problem even if you err in some finer details. So, make sure you clearly write down the main idea(s) behind your solution even if you could not figure out a complete solution.

Be sure to carefully read the grading guidelines page linked off the course web page.

A final piece of advice: Begin work on the problem set early and don't wait till the deadline is only a few days away.

Readings: Kleinberg and Tardos: Chapter 5.

Each problem is worth 10 points unless noted otherwise. All problem numbers refer to the Kleinberg-Tardos textbook.

1. Chapter 4, Problem 1.
2. Chapter 4, Problem 2.
3. Chapter 4, Problem 13.
4. Chapter 4, Problem 24.
5. Suppose you break a file into 8 bit characters and find that all 256 combinations are present, with the most frequent occurring less than twice as often as the least frequent. Prove that the Huffman code for this data will not result in a shorter file.