

Homework Assignment #4 (revised)

CS 410/584 Algorithm Design & Analysis: Spring 2009

This assignment is due Wednesday, 13 May, at the beginning of class. You should work alone on this assignment. However, you are free to discuss the problems on the class mailing list. (Or you can send me email questions directly; please put “CS 584” at the beginning of the subject line.) Please put “410” or “584” on your paper, depending on which section you are registered in.

Reading: Chapter 26.1-3; Chapter 28.1, 28.2, 28.4; Chapter 30; Chapter 32 intro, 32.1, 32.3, 32.4

Note: On any homework exercise where you are asked to give an algorithm, you must also provide an English description of how it works and at least one example execution.

Exercises: 25.2-6 (5 points; no need for an example), 26.2-2 (10 points; show each augmenting path you use and the final flow), 28.4-1 (10 points), 28.4-4 (20 points, 584 only. Hint: Do Exercise 4A first.), ~~30.2-2 (5 points; show the results of the recursive calls of FFT.)~~

4A (10 points): Let A be the adjacency matrix for directed graph G . What does A^2 represent (assuming Boolean matrix multiplication)? Show an example for a graph of at least 5 nodes.

4B (10 points): Explain how you would evaluate $x^{56} + x^{36} + x^5$ at a point using many fewer than 55 multiplications.

4C (5 points): Prove that $\omega_{2r}^k = -\omega_{2r}^{k+r}$.