

Homework Assignment #5

CS 410/584 Algorithm Design & Analysis: Spring 2009

This assignment is due Wednesday, **3** June, 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: Chapters 33 and 34 all, 35.1

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

Exercises: 30.2-2 (5 points; show the results of the recursive calls of FFT.), 33.1-5 (15 points), 33.2-3 (15 points), 33-3 (20 points. 584 only).

5A (15 points): This question concerns string matching. Suppose a text string has been preprocessed to create a *sorted* list of positions of each character in the string. For example

```
    "this is a test text"
would have the lists
a: 9
e: 12, 17
h: 2
i: 3, 6
s: 4, 7, 13
t: 1, 11, 14, 16, 19
x: 18
blank: 5, 8, 10, 15
```

Give an efficient algorithm for finding all occurrences of a pattern in the text if such lists exist for the text. **Hint:** Exploit the sorted order of the lists.

5B (10 points): Given four distinct points, give an algorithm to determine if they are the corners of a square. Do not use division or square root.