

HOMEWORK#1

Due Date: September 30th, 2009 11:55p.m. (100 points)

CS 5926 DESIGN & ANALYSIS OF ALGORITHM

Department of Computer Science, Texas State University

1) Devise an efficient divide-and-conquer algorithm for the Tower-of-Hanoi problem when the disks are colored alternately red and blue, and we add the extra rule that no disk may be placed on any other disk of the same color. Proof the correctness of your result.

2) Derive among Binay1 and Binary2 searches given in class notes which one performs better for a successful search on average.

3) A class of students has been given the task of developing a solution for an algorithm that would evaluate the number of snow flakes by that they can see through a window. Students have decided to make counting as a key step in their algorithms, also representing running time through that step. Students provided the following running times for each algorithm that they developed:

$$A = 200 \log(\log(n)) + 32 \log(\log(\log(n^2)))$$

$$B = 2^{\log(n)} - 3n^{0.5} + 10$$

$$C = (\sqrt{2})^{\log^2(n)} + n^{0.5}$$

$$D = 3 \cdot 2^{2^n} + \log(2 \log(n))$$

$$E = 2^n + 5n + 500$$

$$F = 10 + 0.5n\sqrt{n} + 432$$

evaluate each solution using big O notation and order the algorithms in terms of their efficiency. Example: $A > B > C \geq D > E > F$

4) Exercise C1.9 page 51 Goodrich book

5) Exercise C1.25 page 53 Goodrich book

SUBMISSION: you can type your homework or use handwriting. In both cases you need to submit it as a your_name.pdf on TRACS website through assignment link. Have your name and ID number on each page of your pdf file!!! Be sure that if the pdf file is printed you can actually read what was printed – if grader cannot read your submission you will receive a zero grade. Each late day of submission will cost you 5% of the maximum grade. Only two days of late submission will be allowed after the deadline.

Cheating and Copy:

You can discuss the problems with other students in class, but write the solution by yourself. If a copy (from your class mate or from web) is caught, all involved submissions (original as well as the copies) will be penalized. It is your responsibility to guard your work. Any copy will result in ZERO grade for the assignment for both party. Only exception is when you report the theft of your work in advance.