

CSCE 3110.0002 Data Structures and Algorithms (Fall 2006)

Assignment 2

Total points: 100

Due Date: 9/26/2006

1. (10 points) Textbook problem 2.1
2. (10 points) Textbook problem 2.3
3. (10 points) Textbook problem 2.7
4. (10 points) Textbook problem 2.12
5. (10 points) Textbook problem 2.20
6. (10 points) Textbook problem 3.23
7. (10 points) Textbook problem 3.30
8. (10 points) Fibonacci numbers.

$$F(n) = \begin{cases} 0 & n = 0 \\ 1 & n = 1 \\ F(n-1) + F(n-2) & n > 1 \end{cases}$$

Implement in two separate files, called fibonacci1.cpp and fibonacci2.cpp, the iterative and the recursive methods for computing Fibonacci numbers. The programs should read from the standard input the value of N, and output the corresponding Fibonacci value. Write down in a table the time (according to your system clock) that it takes for each program to complete, for each of the following N values: 1, 2, 4, 8, 16, 32, 64.

9. (10 points) Implement a doubly linked list with methods: size(list), isEmpty(list), isFirst(node), isLast(node), insertBefore(newNode, node), insertAfter(newNode, node), remove(node), swap(node1, node2)

10. (10 points) Solve the following recurrence relations

$$T(n) = T(n-1) + n, T(1) = 1$$

$$T(n) = 2T(n/2) + n^2, n = 2^k, T(1) = 1$$

Notes:

- make sure you include your name in each program and in the README file.
- make sure all your programs are fully commented, and compile and run correctly on the CSP machines.
- write a README file including the answers to problems, and a detailed note about the functionality of each of the above programs, and complete instructions on how to run them.
- submit your assignment by the due date using the 'project' program.