

CS1102S Data Structures and Algorithms

Assignment 01: Algorithm Analysis

Submission on A-4 sheets (if more than one sheet, please staple), before 6pm on Wednesday, 27/1, to lecturer's office, COM1, #03-28. (If the door is closed, slip your solution under the door.)

1. Exercise 2.1 on page 50: Order the following functions by growth rate: N , \sqrt{N} , $N^{1.5}$, N^2 , $N \log N$, $N \log \log N$, $N \log^2 N$, $N \log(N^2)$, $2/N$, 2^N , $2^{N/2}$, 37 , $N^2 \log N$, N^3 . Indicate which functions grow at the same rate and show why this is the case.
2. Exercises 2.22–2.24, pages 53-54:
 - (a) Show that X^{62} can be computed with only eight multiplications.
 - (b) Write the fast exponentiation routine without recursion in Java. Submit your solution on paper, and be ready to explain it during tutorials. You may try to implement the algorithm in Java (optional).
 - (c) Give a precise count on the number of multiplications used by the fast exponentiation routine in the textbook. (Hint: Consider the binary representation of N .)