Imperial College London – Department of Computing

MSc in Computing Science

580: Algorithms Tutorial 1

- 1. Using asymptotic notation, state an upper and lower bound for the time complexity of the SimpleSearch procedure for any input. Can you also give a tight (Θ) bound?
- 2. (Cormen Exercise 3.1-4). The formal definition of O is:

 $O(g(N)) = \left\{ \begin{array}{c} f(N) \mid & \text{there are positive constants } c \text{ and } N_0 \\ & \text{such that } 0 \leq f(N) \leq c \, g(N) \text{ for all } N \geq N_0 \end{array} \right\}.$ Using this definition, show whether each of the following statements is true or false.

- (a) $2^{N+1} = O(2^N)$
- (b) $2^{2N} = O(https://powcoder.com)$
- 3. If a_0 and a_1 are constants, and a_2 is a positive constant, show that $a_2N^2 + a_1N + a_0$ is not in O(N). What are the consequences for algorithm design? What are the limitations of these consequences O(N) where the consequences for algorithm design? What are the limitations of these consequences O(N) is a supercondition of the consequence of O(N) is a supercondition of the consequence of O(N).