2020/03/18 Algorithm Homework

Note: When the exercise asks you to "design an algorithm for…," it always means that "designs an EFFICIENT algorithm for … and ANALYZES your algorithm". You should keep this in mind when writing solutions.

1. Given a sorted array $A[1…n]$ of n distinct integers, you want to find out the index i for which $A[i] = i$ if it exists. Please design a Divide-and-Conquer algorithm that runs in time $O(\lg n)$. (Analyze your algorithm and show it is correct.)(要寫Code)

2. Analyze best-case, average-case, and worst-case performance of the following pseudocode which describes a sorting algorithm. Append your analyzing process or reasons.

        i = 2
        while i <= size
                        if i == 1 or array[i] >= array[i - 1]
                                i += 1
                else
                        swap array[i], array[i - 1]
                        i -= 1

3. **[CLRS 3ʳᵈ] Problem 3-2: *Relative asymptotic growths***

4. Given two non-negative function f, g (i.e. f, $g : N \rightarrow R^*$) such that $f \neq O(g)$, $f \neq \theta\ (g)$, and $f \neq \Omega(g)$.

5. **[CLRS 3ʳᵈ] Problem 3-3 Ordering by asymptotic growth rates**

6. **[CLRS 3ʳᵈ] Problem 3-4 Asymptotic notation properties**

   i. f(n) = *Θ(g(n)) implies* $\lim\limits_{n \to \infty} \frac{f(n)}{g(n)} = c \neq 0$

7. **[CLRS 3ʳᵈ] Problem 6-3: Young tableaus**