Algorithms in Bioinformatics

Fall 2018

Homework 2, week 4 （30 points）

1. (5 points)

Write pseudocode for MERGE(A, p, q, r) .

2. (5 points)

Use merge sort to sort an array A={1, 41, 52, 33, 38, 54, 9, 42}. Draw a diagram to show the sorting procedure.

3. (10 points)

Use mathematical induction to show that the solution of the recurrence

$$T(N) = \begin{cases} 2; if\ N = 2 \\ 2T(N/2) + N; if\ N = 2^k \end{cases}, k > 1$$

is $T(N) = NlogN$.

4. (10 points)

For each function f(n) and time t in the following table, determine the largest size n of a problem that can be solved in time t, assuming that the algorithm to solve the problem take f(n) microseconds.

t / f(n)	1 second	1 minute	1 hour	1 month	1 year	1 century	
$\lg n$							
$\sqrt{n}$							
n							
$n \lg n$							
n^2							
n^3							
2^n							
n!							

Turning in your work

Submit your results (all in one file and name it as Yourname_hw1.doc or Yourname_hw1.pdf, please) to TA Huimin Lu at linuslu6@outlook.com by 10:00 AM on April 2nd, 2018.

Please cut, sign the following paper, and then return it together with a paper copy of your home work to the teacher.

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独立作业承诺：（请选择一个， 并签名）

1. 本人，_____，保证本次作业 hw1 由自己独立完成。

   签名

   时间　　年　月　日

或者

2. 本人，_____，保证本次作页 hw1 和_____同学讨论后，由自己独立完成。
   讨论内容包括_____

   签名　　，

   时间　　年　月　日