Algorithm

Assignment #2

Due: Apr.-21 (Wed.) (before 11:59pm)

Instruction.

a. You have 2 problems in this assignment.

b. Submit your report to iCampus in **PDF file format (ID_A2.pdf)**.

- You can scan or take a picture of your paper.

c. Any work that you turn in should be your own.

Problem #1. Asymptotics (50 pts)

Indicate, for each pair of expressions (A, B) in the table below, whether A is O, o, Ω, ω, or Θ of B. Assume that $k \geq 1$, $\epsilon > 0$, and $c > 1$ are constants. Fill each box of the table in the form with "yes" or "no". You are required to **show your steps**.

	A	B	O	o	Ω	ω	Θ
a.	$\lg^k n$	n^ϵ					
b.	n^k	c^n					
c.	$\sqrt{n}$	$n^{\sin n}$					
d.	2^n	$2^{n/2}$					
e.	$n^{\lg c}$	$c^{\lg n}$					
f.	$\lg(n!)$	$\lg(n^n)$					

Problem #2. Recurrences (50 pts)

1) Use a recursion tree to determine good asymptotic upper bounds for $T(n)$ in each of the following recurrences. **Show your steps**.

a. $T(n) = 4T\left(\frac{n}{2}\right) + n$

b. $T(n) = 2T(n-1) + 1$

2) Give asymptotic upper and lower bounds for $T(n)$ in each of the following recurrences. Assume that $T(n)$ is constant for sufficiently small n. **Show your steps.**

a. $T(n) = 2T\left(\frac{n}{4}\right) + \sqrt{n}$

b. $T(n) = 3T\left(\frac{n}{3}\right) + \frac{n}{lg\, n}$