Assignment 2

Design and Analysis of Algorithms

[1]The following problems are from *Introduction to Algorithms*, by CLRS.

Points	Second Edition	Third Edition
10	Page 50: 3.1-2	Page 52: 3.1-2
10	Page 50: 3.1-4	Page 53: 3.1-4
10	Page 57: 3.2.3	Page 60: 3.2.3
10	?	Page 87: 4.3-1
10	?	Page 92: 4.4-1

The symbol ? ('question mark') in the above table, means that the corresponding problem is not present.

Using only first principles, give tight asymptotic bounds for the following recurrences:

(a) (10 points) $T(1) = \Theta(1)$; $T(n) = 2T(n/4) + 1$, for $n \geq 2$

(b) (10 points) $T(1) = \Theta(1)$; $T(n) = 2T(n/4) + n$, for $n \geq 2$

Extra Credit Problem (40 points): Establish Stirling' formula for the approximation of $n!$ for large values of n. Show that it is equal to A_n, where

$$A_n = \sqrt{2\pi n} e^{-n} n^n$$

Define

$$R_n = \frac{(n! - A_n)}{n!}$$

Generate a table of $n, n!, A_n$ and R_n for $n = 1, 2, 3, \ldots, 10$.

Hint: Use Internet to obtain an expression for A_n. Sometimes, the solution might appear to be messy. You might want to look for a relatively simple solution.

Practice Problem: Page 61 (Third Edition), Problem: 3-2. You do not have to submit this problem.

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