COMP3711H

Homework 1

LAM, Pak Ho

A COMP3711H Written Assignment

THE HONG KONG
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AND TECHNOLOGY

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Question 1

a. There are 6^i subproblems at the level i of recrusion tree.

b. The input size of each problem is $\dfrac{n}{2^i}$

c. $\left(\dfrac{n}{2^i}\right)^2$ work is done in one subproblem of level i.

d. Summing all subproblems in level i, the total work is $6^i \times \left(\dfrac{n}{2^i}\right)^2 = \left(\dfrac{3}{2}\right)^i \times n^2$

e. There are $\log_2 n + 1$ levels.

f. As the non recursive work is multiplied with $\frac{3}{2}$ which is larger than 1, the bound is dominated by the leaves. From d we know the total work at the bottom level with leaves is $\left(\dfrac{3}{2}\right)^{\log_2 n}$

The asymptotically tight upper bound on $T(n)$ is $\left(\dfrac{3^{\log_2 n}}{n}\right) \times n^2 = n^{log_2 3} \times n = n^{\log_2 6}$