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Recitation: 8

Problem 0

Points:

Acknowledgements

(a) I did not work in a group.

(b) I did not consult without anyone my group members.

(c) I did not consult any non-class materials.

Problem 1

Points:

Solving recurrences

$$T(n) = aT(n/b) + \theta(n^d)$$

(a) Here, $d = 1.3$ and $\log_b a = \log_5 11 = 1.48$

So, $\log_b a > d$, we will use case-3 of Master's Theorem:

$T(n) = \theta(n^{\log_5 11}) = \underline{\theta(n^{1.48})}$

(b) Here, $d = 2.8$ and $\log_b a = \log_2 6 = 2.58$

So, $d > \log_b a$, we will use case-1 of Master's Theorem:

$T(n) = \underline{\theta(n^{2.8})}$

(c) Here, $d = 0$ and $\log_b a = \log_3 5 = 1.46$

So, $\log_b a > d$, we will use case-3 of Master's Theorem:

$T(n) = \theta(n^{\log_3 5}) = \underline{\theta(n^{1.46})}$

(d) $T(n) = T(n-2) + \log(n)$

$= [T(n-4) + \log(n-2)] + \log(n)$

$= [T(n-6) + \log(n-4)] + \log(n-2) + \log(n)$

$\vdots$

$= [T(n-k) + \log(n-(k-2))] + \cdots + \log(n-2) + \log(n)$

let $k = n$,

$= T(0) + \log(2) + \cdots + \log(n)$

$= 1 + \log(n!)$

$= \log(n\log(n))$

Problem 2

Points:

Sorted Array

Problem 3

Points:

Linear Time Sorting