Govt engineering college Jhalawar

Depart. Computer Science and Engineering

Time: 1 hrs | I Mid-Term Exam | MM: 10

VI Semester | Design and Analysis Algorithm

Date 15/02/18

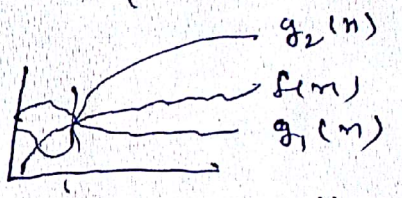
1. Explain asymptotic notation with example. [4]
2. Applying quick sorting method for following element: 75 55 60 50 85 [3]
3. Find complexity for recurrences [3]
   a. $T(n)=T(n-1)+n$
   b. $T(n)=T(n/3)+T(2n/3)+n$

Ramprasad
15/02/18
(Ramprasad Jat)

Answer

Ans: 1. Θ-notation

$c_1 g_1(n) \leq f(n) \leq c_2 g_2(n)$



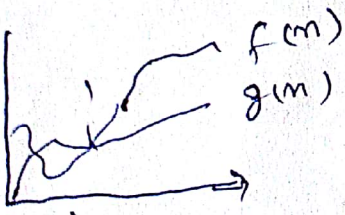
Θ-notation

O-notation

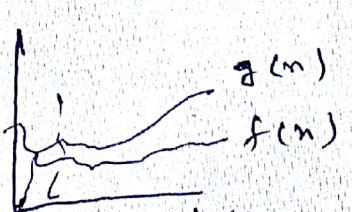
$f(n) \leq cg(n)$

Ω-notation

$cg(n) \leq f(n)$



Ω-notation



O-notation

Ans. 2. 75 55 60 50 85

Step 1 ↑ pivot

Step 2 75 55 60 50 | 85

↑ pivot

75 > 50

interchange.

50 55 60 75 85

sorted

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Answer 3

(a) $T(n) = T(n-1) + n$

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

$T(n-3) + (n-2) + (n-1) + n$

For k^{th} $T(n-k) + (n-(k-1)) + \dots + (n-k) + n$

$= T(n-k) + \sum_{k=1}^{n} (n-k)$

$= T(n-(n-1)) + \frac{n(n-1)}{2}$

if $n=k$ $= T(0) + \frac{n^2 - n}{2}$

$= 1 + \frac{n^2-n}{2}$

Θ max n power $= n^2$

$\Theta(n^2)$

(b) $T(n) = T(n/3) + T(2n/3) + n$

$a=1$ $b=3/2$ $f(n) = n$

$\log_{3/2} 1 + \epsilon$

$0+1$ $c=1$

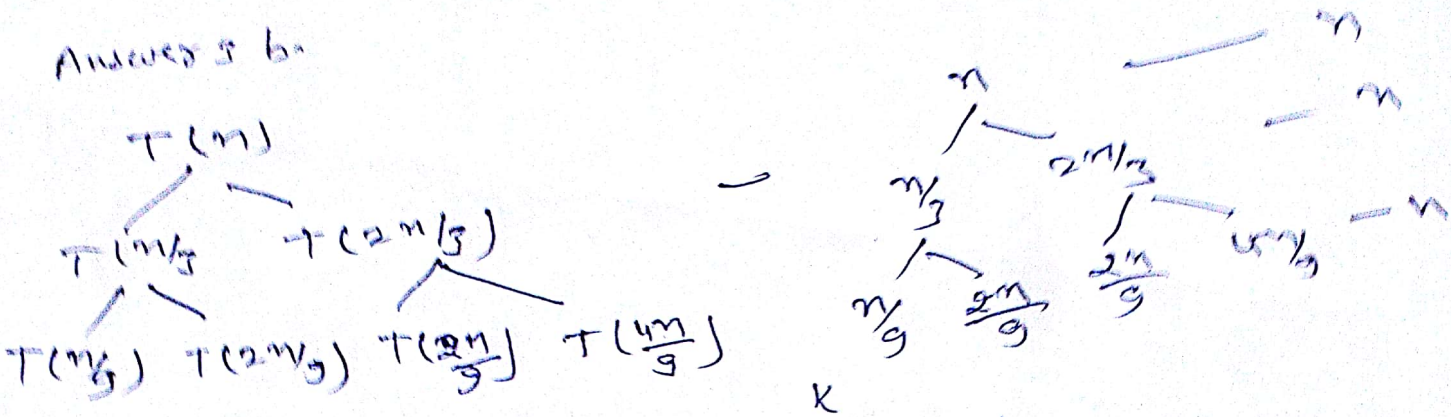
Case 3 master method

$n \geq n$

$n = n$

So $T(n) = f(n)$

Answer : b.



The height of tree $n\left(\frac{2}{3}\right)^{k} \leq 1$

$n \leq \left(\frac{3}{2}\right)^{k}$

$k \geq \log_{3/2} n$

$T(n) \geq n \log_{3/2} n = \Omega(n \log n)$