DAC - Part III

Complete Course on Algorithm for GATE - CS & IT

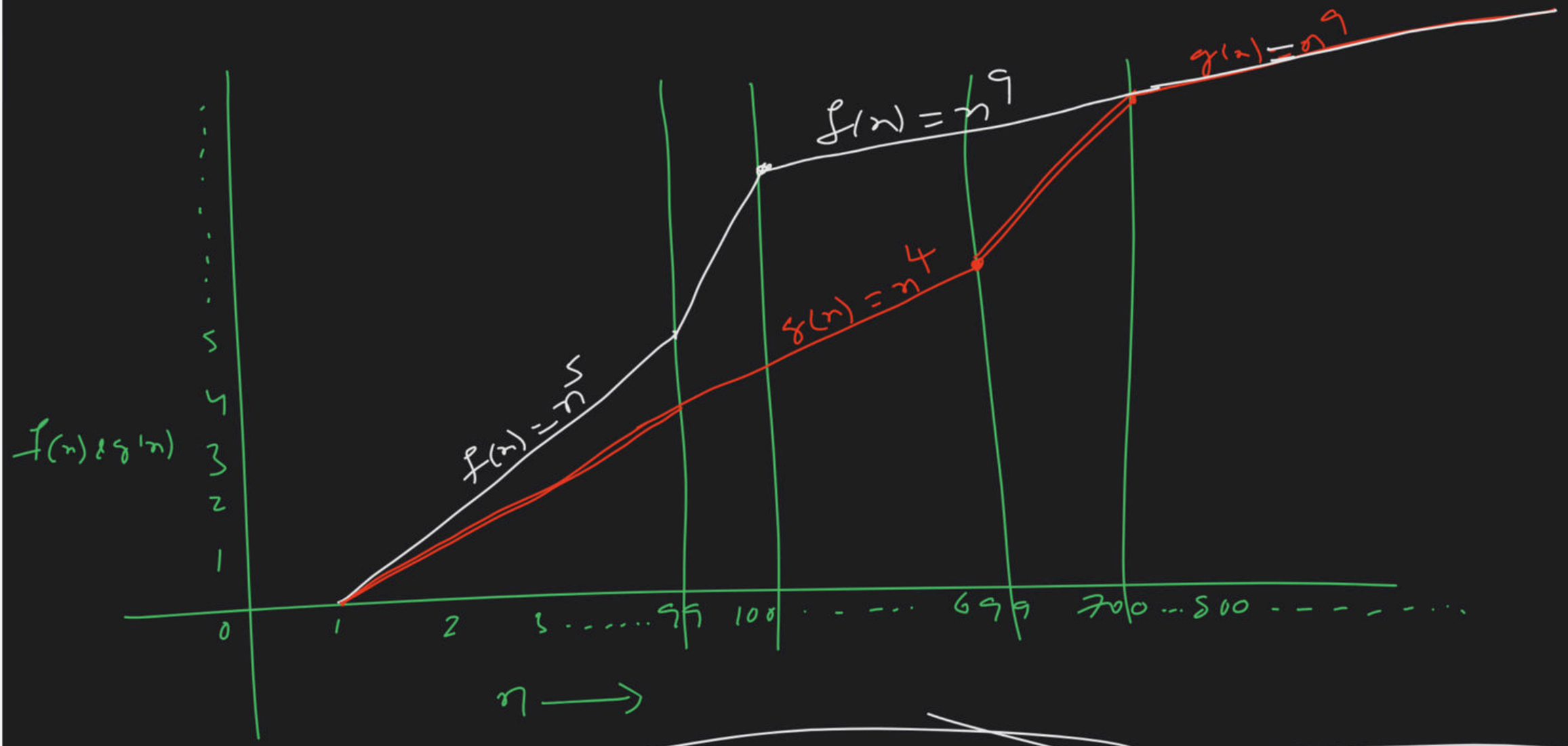
Subbarao Lingamgunta • Lesson 14 • Dec 18, 2022

consider the following functions

$$f(x) = \begin{cases} x^5 & \text{if } 0 < x < 100 \\ x^9 & \text{if } x \geq 100 \end{cases}$$

$$g(x) = \begin{cases} x^4 & \text{if } 0 < x < 300 \\ x^9 & \text{if } x \geq 300 \end{cases}$$

relation b/w $f(x)$ & $g(x)$?



$f(n) = \Theta(g(n))$
$n_0 = 700$

$\Longleftarrow$

$f(n) = O(g(n))$
$n_0 = 700$

$f(n) = \Omega(g(n))$
$n_0 = 1$

Which will satisfy reflexive property?

(3) O, Ω, Θ, o, ω

O ✓ Ω ✓ Θ ✓ o ✗ ω ✗

$f(n) = O(g(n))$

Which will satisfy symmetric property?

(4) ~~O~~, ~~Ω~~, Θ, ~~o~~, ~~ω~~

If $f(n) = \Theta(g(n))$

then

$g(n) = \Theta(f(n))$

~~$n^{2n} = \Theta(n^n)$~~

~~$n^n = \Theta(n^{2n})$~~

$n^n = \Theta(n^n)$

Transitive property

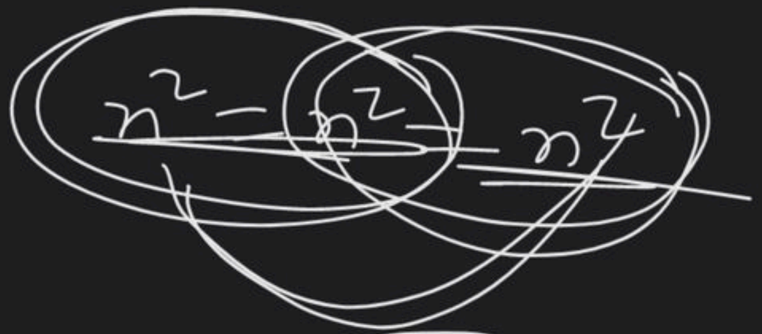
If $f(n) = O(g(n))$ & $g(n) = O(h(n))$

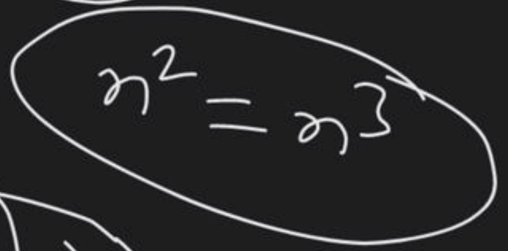
then

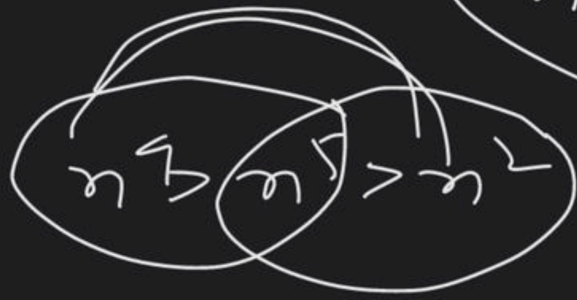
$f(n) = O(h(n))$

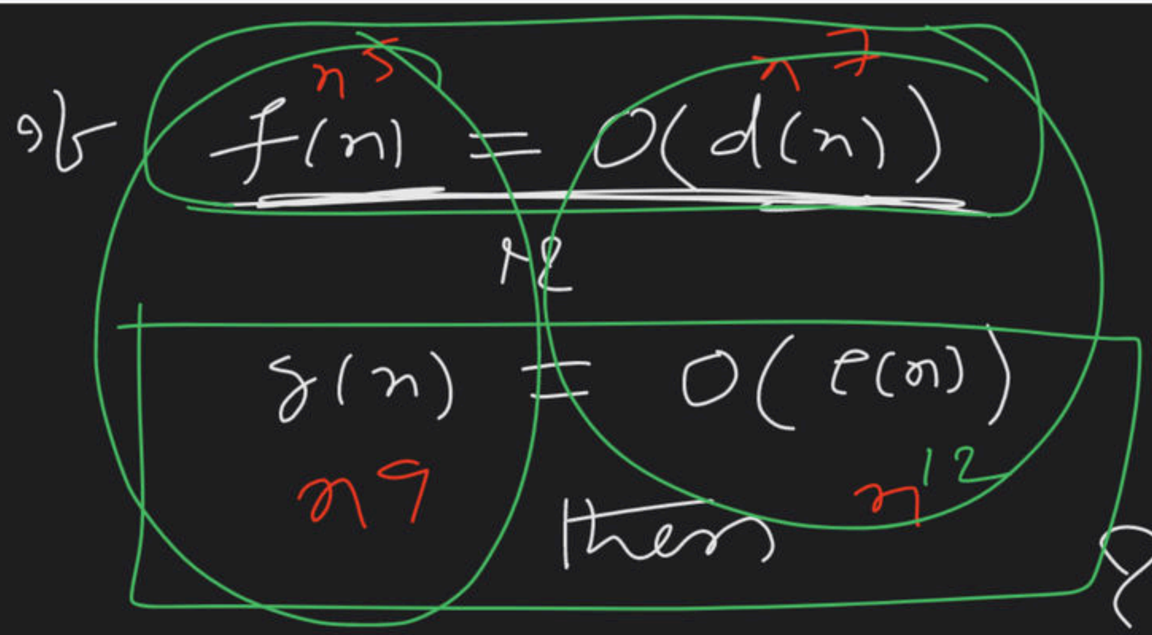
(5)

$\Rightarrow O$ ✓, Ω ✓, Θ ✓, o ✓, ω ✓









Note

① $f(n) + g(n) = O(d(n)) \quad O(e(n))$

$= O(d(n) + e(n))$

(or)

$O[\max(d(n), e(n))]$

(2) $f(n) \cdot g(n) = O(d(n) \cdot e(n))$

Note

If $f(n) = O(g(n))$

then

$f(n) \cdot h(n) = O(g(n) \cdot h(n))$

$T_1(n) = \Omega(f(n))$

$T_2(n) = \Omega(f(n))$

Then

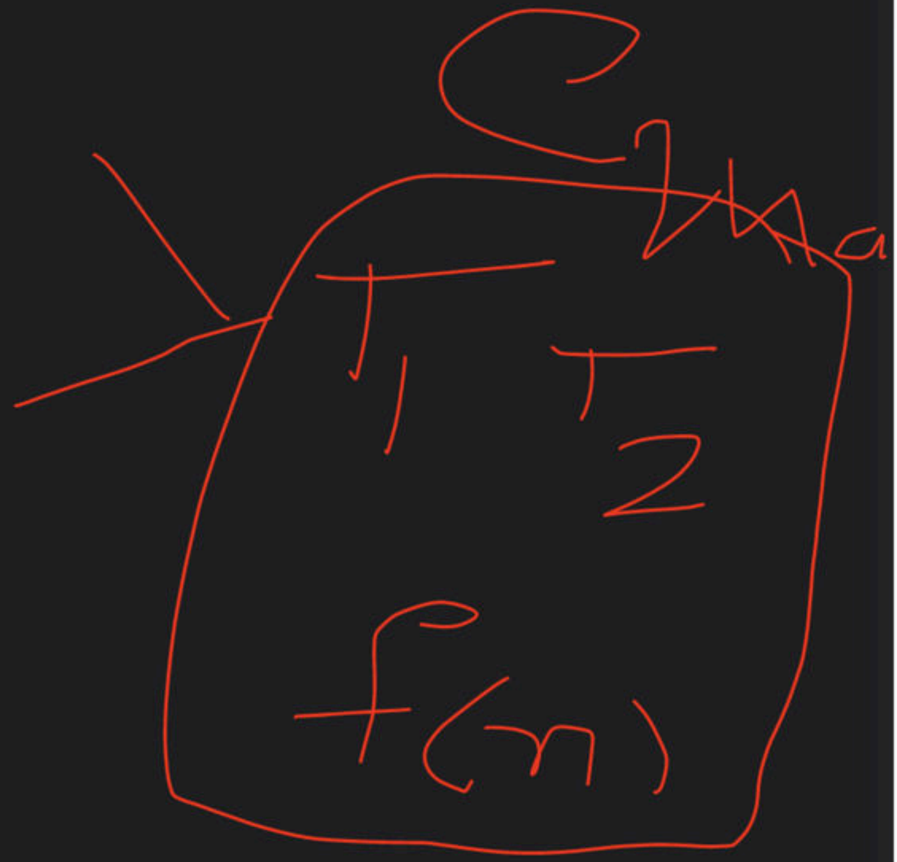
T/F

(a) $T_1(n) + T_2(n) = O(f(n))$

(b) $T_1(n) = O(T_2(n))$

(c) $T_1(n) = \Omega(T_2(n))$

(d) $T_1(n) = \Theta(T_2(n))$



$f(n) = O(g(n))$ 그리고 $g(n) \neq O(f(n))$ $\Rightarrow f(n) < g(n)$

$g(n) = O(h(n))$ 이고 $h(n) = O(g(n))$

$\Rightarrow g(n) = h(n)$

$f(n) < g(n) = h(n)$

T/F

(a) $f(n) = O(h(n))$

(b) $f(n) + g(n) = O(h(n))$ ($g(n)$)

(c) $f(n) \cdot g(n) = \Theta(g(n) \cdot h(n))$

(d) $g(n) = \Theta(h(n))$

$n^5 = O(n^7)$

$n^7 = O(n^5)$

$n^2 \cdot n^7 = n^9 \cdot n^7$

$n^5 = O(n^5)$

$n^5 \neq O(n^3)$

$n^5 = O(n^7)$

틀린 이유

Recursion

unacademy

▲ 1 • Asked by Sai Teja

Please help me with this doubt

17 December 2022 at 11:31 PM

According Mathematical we can say about increment or decrement function but here we Min case is 0(1) how can loop have 1/n iteration.