Topics to discuss

Properties of Asymptotic Notations.

1. <u>Transitive Property</u> :

$f(n) = O(g(n))$ and $g(n) = O(h(n))$ then $f(n) = O(h(n))$.

valid for Ω and Θ as well.

$f(n) = 1$ $g(n) = n$ $h(n) = n^2$

$1 \leq n$ $n \leq n^2$

$\boxed{1 \leq n^2}$

$f(n) \leq c \cdot g(n)$

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

② Reflexive Property :

$f(n) = O(f(n))$. Valid for Ω and Θ also.

$\boxed{f(n) \le c \cdot g(n)}$

$f(n) = n^2$

$f(n) = O(n^2)$

③ Symmetric Property

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

Valid for only Θ.

$$\boxed{0 \leq c_1 g(n) \leq f(n) \leq c_2 g(n)}$$

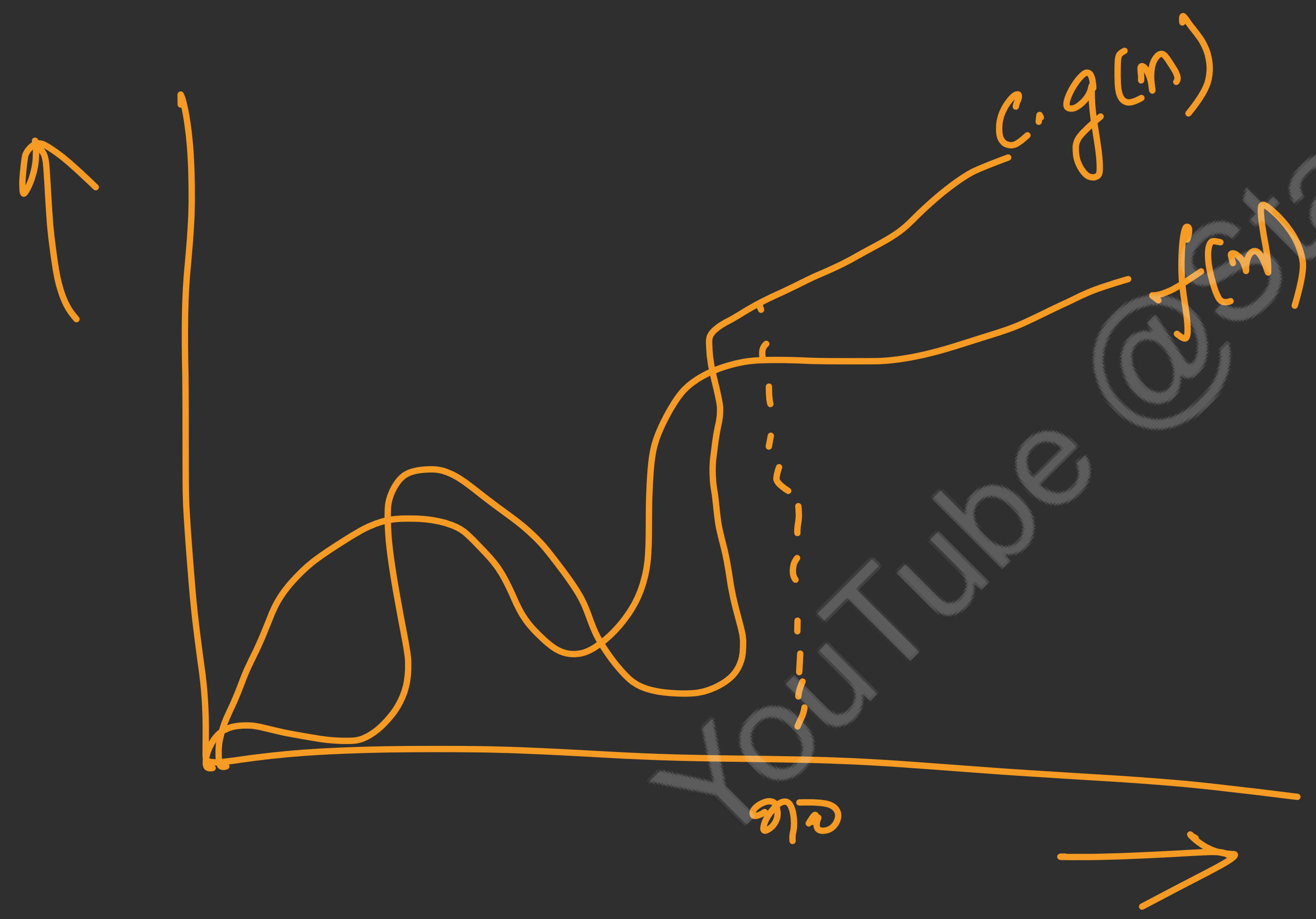
$f(n) = \Theta(n^2)$

$g(n) = \Theta(n^2)$

(4) Transpose Property :

If $f(n) = O(g(n))$ then $g(n) = \Omega(f(n))$

True for upper and lower bound.



⑤ If $f(n)$ is in $O(kg(n))$ for all constant $k \geq 0$, then $f(n)$ is in $O(g(n))$.

$f(n) = 2n \Rightarrow k = 2$

$f(n) = O(2g(n))$

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

⑥ If $f_1(n)$ is in $O(g_1(n))$ and $f_2(n)$ is in $O(g_2(n))$ then $(f_1+f_2)(n)$ is in $O(\max(g_1(n), g_2(n)))$.

$f_1(n) = n$ $\quad$ $g_1(n) = n$ $\quad$ $\Rightarrow f_1(n) = O\, g_1(n)$

$f_2(n) = n^2$ $\quad$ $g_2(n) = n^2$ $\quad$ $\Rightarrow f_2(n) = O\, g_2(n)$

$(f_1+f_2)(n) = O(\max g_1(n), g_2(n))$

$= O(n^2)$

$f(n) = n + n^2$

$g(n) = n^2$

(7) If $f_1(n)$ is in $O(g_1(n))$ and $f_2(n)$ is in $O(g_2(n))$ then $f_1(n)\, f_2(n)$ is in $O(g_1(n)\, g_2(n))$.

$f_1(n) = n$

$f_2(n) = n^2$

$f_1(n) \cdot f_2(n) = n \times n^2 = n^3$

$f'(n) = O(n^3)$

Follow Now

Start Practicing

i._am._arfin

Arfin Parween