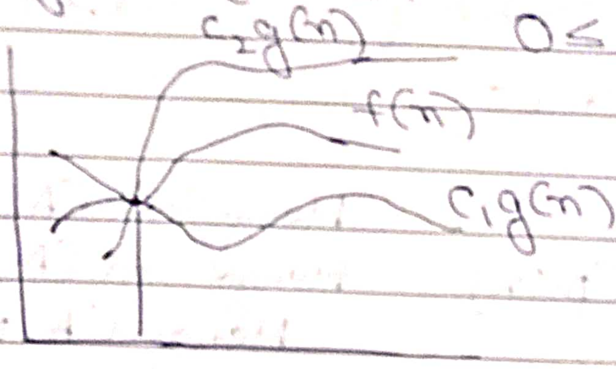
L2 Growth of function :→

$\Theta(g(n)) = \{f(n)\}$, there exists c_1, c_2 & n_0 such that
$0 \le c_1 g(n) \le f(n) \le c_2 g(n)$
for all $n \ge n_0$



$O(g(n)) = \{f(n) \mid$ there exists c_1 & n_0 such that
$0 \le f(n) \le c_1 g(n)$ for all $n \ge n_0$

$f(n) \in \Theta(g(n)) \Rightarrow f(n) \in O(g(n))$
$\Theta(g(n)) \subseteq O(g(n))$

Ω notation :→

$\Omega(g(n)) = \{f(n) \mid$ there exists c_1 & n_0 such that
$0 \le c_1 g(n) \le f(n) \; \forall n \ge n_0$

$f_1(n) \in \Theta(g(n)) \Rightarrow f_1(n) \in \Omega(g_1(n))$ $n_1 \ge n_0$
$\boxed{\Theta(g(n)) \subseteq \Omega(g(n))}$

$\Rightarrow f_1(n) \in \Theta(g(n)) \Rightarrow$ if & only if $f_1(n) \in O(g(n))$
& $f_1(n) \in \Omega(g(n))$

o-notation

$o(g(n)) = \{f(n) \mid$ for any $c > 0$ $\exists$ n_0 such that
$0 \le f(n) < c g(n)$

ω -

$\omega(g(n)) = \{f(n) \mid$ $\forall n > n_0$
$0 \le g(n)$ $c g(n) < f(n)$

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DATE / /
PAGE 5

$\Rightarrow f(n) \in \Theta(g(n)) \Rightarrow f(n) \in O(g(n)), f(n) \in \Omega(g(n))$

$\Rightarrow$ Max^m Subarray Problem :$\longrightarrow$

1 2 3 . . . 10

price $- c_1\ c_2\ c_3 \cdots c_{10}$

1 2 3 10

$\delta\Delta - 0\quad c_2-c_1\quad c_3-c_2 \cdots c_{10}-c_9$

$$T(n) = 2T\left(\frac{n}{2}\right) + c_1 n + c_2 = 2T\left(\frac{n}{2}\right) + \Theta(n)$$

$$T(n) = \Theta(n \log n)$$

Max (A, low, high, mid)

left sum = -1e9
sum = 0
for (i = mid → low)
sum += a[i]
if sum > ~~leftsum~~ left sum
leftsum = sum
Maxleft = i

Same for right

return ({maxleft, maxright, leftsum + rightsum})

Matrix Multiplication

$A = (a_{ij})_{n \times n}$

$B = (b_{ij})_{n \times n}$

$C = A \times B$

$\hookrightarrow (c_{ij})_{n \times n}$

$T(n) = \Theta(n^3)$