EX-4

Special Functions.

$\log\frac{1}{2} =$

① $f(n) = n^2 \log n + n$, Find $\Theta()$, $O()$, $\Omega()$.

($\log 1 = $ zero)

($\log 2 = 0.3$)

$c_1 \cdot g(n) \leq f(n) \leq c_2 \cdot g(n)$

$1 \times n^2\log n \leq n^2\log n + n \leq 10 n^2 \log n$

$\forall n \geq 2$

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

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

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

$f(n) = \Omega(n^2 \log n)$

② $f(n) = n!$ Find $\Theta()$, $O()$ & $\Omega()$;

$n! = n \times (n-1) \cdot (n-2) \cdots \times 1.$

$c_1 \cdot g(n) \leq f(n) \leq c_2 \cdot g(n)$

$1 \times 1 \times 1 \cdots \times 1 \leq (1 \times 2 \times 3 \times \cdots \times n) \leq n \times n \times n \times \cdots \times n.$

$1 \leq n! \leq n^n$ — Ⓐ

$\therefore f(n) = O(n^n)$

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

But $f(n) = n!$ don't have tight bound $\Theta(g(n))$

Since, $g(n)$ do not exist an RHS & LHS in eqn Ⓐ