

Asymptotic Expressions

- (a) Which of the following expressions are true? Check all that apply. Equations between asymptotic expressions, such as $O(f) = O(g)$ simply mean that all functions that are $O(f)$ are also $O(g)$ and vice-versa. An expression such as $O(f) \subseteq O(g)$ means that all functions that are $O(f)$ are also $O(g)$.

$\Theta(1000 * N^3 + N * \log(N)) = \Theta(N^3)$.

For all $k \geq 0$, $O(N^k) \subseteq O(N^{k+1})$.

For all $k \geq 0$, $\Omega(N^k) \subseteq \Omega(N^{k+1})$.

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- (b) For positive-valued functions $f_0 \dots f_k$, where we define $f_i(n) = 1 + f_{n \% i}(n)$ for $i \geq 1$ and $f_0(n) = 1$, which of the following are true? Check all that apply. Assume that $n > k$.

The evaluation of $f_k(n)$ may run forever.

$f_k(n) = \Omega(\log(k))$, with respect to k .

$f_k(n) = O(k)$, with respect to k .

$f_k(n) = \Theta(1)$, with respect to n .

If $n = k! - 1$, $f_k(n) = \Theta(k)$, with respect to k .