

Asymptotic Notation

Reset Progress

Reveal Solutions

1 Definitions

Which of the following is the correct English description of $f(n) = O(g(n))$?

- For every constant $c > 0$, there is an n_0 , such that for all $n \geq n_0$, we have $f(n) \leq c \cdot g(n)$.
- There is some $c > 0$ and some n_0 , such that for all $n \geq n_0$ we have $f(n) \leq c \cdot g(n)$.
- For every n_0 , there is some constant $c > 0$ such that for all $n \geq n_0$ we have $f(n) \leq c \cdot g(n)$.

Correct

Suppose that $g(n) > 0$ for all integers n . Then is $f(n) = O(g(n))$ equivalent to the following simpler definition that avoids n_0 ?

$$\exists c > 0 : \forall n f(n) \leq c \cdot g(n)$$

- Yes
- No

Correct

Suppose that $f(n) = O(g(n))$. Which of the following is implied by this fact?

- $g(n) = \Omega(f(n))$
- $g(n) = O(f(n))$
- Both
- Neither

Correct

If $f(n) = O(g(n))$, is it true that $2^{f(n)} = O(2^{g(n)})$?

- Yes
- No

Correct

2 Examples

What is the smallest exponent x such that

$$n^2 + n^3 - n = O(n^x)?$$

3

Correct

Which of the following describes $n(n+1)(n+2)/6$?

- $O(n^4)$
- $O(n^3)$
- $\Theta(n^3)$
- $\Omega(n^2)$
- All of the above

Correct

For which exponents x is $n(n+1)/2 = \Theta(n^x)$?

- 1
- 2
- 3
- All of the above

Correct

For which function $g(n)$ is it true that $n^2 = O(g(n))$?

- $g(n) = 1.01^n$
- $g(n) = 2^n \cdot \sin(\pi n/2)$
- $g(n) = 2^n \cdot \cos(\pi n/2)$
- All of the above

Correct