1 Definitions

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

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

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 ? Note the implicit assumption that f(n) and g(n) are functions over nonnegative integers.

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

Yes

O No

Correct

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

- O g(n) = O(f(n))
- O Both
- O Neither

Correct

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

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

Correct

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

- O 1
- **0** 2
- O 3
- O All of the above

Correct

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

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

Correct