Big-O

Back to Week 2

6/7 points earned (85%)

Quiz passed!

1 / 1 points

1.

Introduction and Learning Outcomes

The goal of this assignment is to practice with big-O notation.

Recall that we write $f(n) = O(g(n))$ to express the fact that $f(n)$ grows no faster than $g(n)$: there exist constants N and $c > 0$ so that for all $n \geq N$, $f(n) \leq c \cdot g(n)$.

Is it true that $\log_2 n = O(n^2)$?

- [x] Yes

Correct Response
A logarithmic function grows slower than a polynomial function.

- [ ] No

1 / 1 points

2.

$n \log_2 n = O(n)$

- [ ] Yes

No

Correct Response

To compare these two functions, one first cancels n. What is left is $\log_2 n$ versus 1. Clearly, $\log_2 n$ grows faster than 1.

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1 / 1 points

3.

$n^2 = O(n^3)$

Yes

Correct Response

n^a grows slower than n^b for constants $a < b$.

No

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1 / 1 points

4.

$n = O(\sqrt{n})$

Yes

No

Correct Response

$\sqrt{n} = n^{1/2}$ grows slower than $n = n^1$ as $1/2 < 1$.

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1 / 1 points

5.

$5^{\log_2 n} = O(n^2)$

Yes

No

Correct Response

Recall that $a^{\log_b c} = c^{\log_b a}$ so $5^{\log_2 n} = n^{\log_2 5}$. This grows faster than n^2 since $\log_2 5 = 2.321\ldots > 2$.

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0 / 1 points

6.

$n^5 = O(2^{3\log_2 n})$

Yes

Incorrect Response

Hint: $2^{3\log_2 n} = (2^{\log_2 n})^3 = n^3$

No

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1 / 1 points

7.

$2^n = O(2^{n+1})$

Yes

Correct Response

$2^{n+1} = 2 \cdot 2^n$, that is, 2^n and 2^{n+1} have the same growth rate and hence $2^n = \Theta(2^{n+1})$.

No
