True or False?

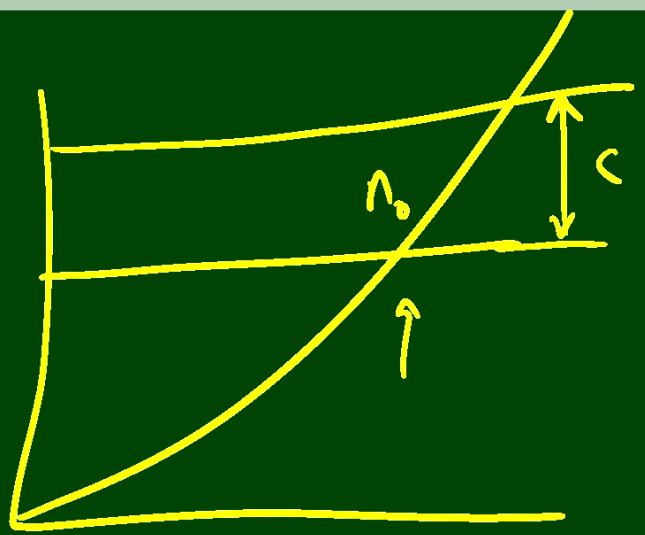
(1) $4+3n \in \mathcal{O}(n)$

(2) $4+3n = \mathcal{O}(1)$

(3) $4+3n$ is $\mathcal{O}(n^2)$

(4) $n+2\log n \in \mathcal{O}(\log n)$

(5) $\log n \in \mathcal{O}(n+2\log n)$



True or False?

(1) $4+3n \in \mathcal{O}(n)$ True $(n = n)$

(2) $4+3n = \mathcal{O}(1)$ False: $(n >> 1)$

(3) $4+3n$ is $\mathcal{O}(n^2)$ True: $(n \leq n^2)$

(4) $n+2\log n \in \mathcal{O}(\log n)$

(5) $\log n \in \mathcal{O}(n+2\log n)$

Definition (Big-Oh)

We say a function $f : A \to B$ **is dominated by** a function $g : A \to B$ when:

$$\exists (c, n_0 > 0).\ \forall (n \geq n_0).\ f(n) \leq cg(n)$$

Formally, we write this as $f \in \mathcal{O}(g)$.

We want to prove $4 + 3n \in \mathcal{O}(n)$. That is, we want to prove:

$$\exists (c, n_0 > 0).\ \forall (n \geq n_0).\ 4 + 3n \leq cn$$

Proof Strategy

$\forall n$

$4 + 3n \leq cn$

$4 + 3n \leq 4n \leq cn$

$n_0 := 4$

$c := 4$

Definition (Big-Oh)

We say a function $f : A \to B$ **is dominated by** a function $g : A \to B$ when:

$$\exists (c, n_0 > 0).\ \forall (n \geq n_0).\ f(n) \leq cg(n)$$

Formally, we write this as $f \in \mathcal{O}(g)$.

We want to prove $4 + 3n + 4n^2 \in \mathcal{O}(n^3)$.

$4 + 3n + 4n^2 \leq 4n^3 + 3n^3 + 4n^3 \leq cn^3$

$n_0 = 1$

$c = 11$