

Question 85287:

Prove or disprove the following:

1. $\log \sqrt{n} \in O(\log n)$, (\sqrt{n} means square root of n)
2. $\log n \in O(\log \sqrt{n})$
3. $2n + 1 \in O(2n)$

Answer:

Def.: $f(n) = O(g(n)) \Leftrightarrow \exists n_0 \in \mathbb{N}, \exists c \geq 0, \forall n \geq n_0, |f(n)| \leq c * g(n)$

1. $|\log \sqrt{n}| = |1/2 \log n| \leq 1 * \log n, \forall n \in \mathbb{N}$
2. $|\log n| = |2 \log \sqrt{n}| \leq 4 * \log \sqrt{n}, \forall n \in \mathbb{N}$
3. $|2n + 1| \leq |2n| + |1| < 4 * n, \forall n \in \mathbb{N}$