
Advanced Algorithms and Data Structures

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Homework 2

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Task 1 (Landau set membership)

4 points

State for each of the following propositions whether it is true or false:

1. $n^2 \in O(n^3)$
2. $3^n \in \omega(2^n)$
3. $n + \lg n \in O(n)$
4. $\lg n \in \Theta(\ln n)$
5. $\forall q > 1 . n \lg n \in o(n^q)$
6. $\lg n \in \Omega(\sqrt{n})$

Task 2 (Properties of the Landau functions)

8 points

Proof the following statements:

1. Lemma 6 from the document “The Landau Symbols”, which is published on the course website, is true.
2. For all $f, g : \mathbb{N} \rightarrow (0, \infty)$, we have $O(f) + O(g) = O(f + g)$.