

COMP3506/7505: Special Exercise Set 2

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For each of the following problems, determine whether the given statement is true. If “yes”, provide a proof; otherwise, just answer “no”.

Problem 1. $5n + 3\sqrt{n} = O(2n + 2)$.

Problem 2. $5n + 3\sqrt{n} = O(n)$.

Problem 3. $n^2 = O(1000 \cdot n \log n)$.

Problem 4. $\frac{\sqrt{n}}{\log_2 n} = O(\sqrt{n})$.

Problem 5. If functions $f(n) = O(n \log n)$ and $g(n) = O(\sqrt{n})$, then $f(n) + g(n) = O(n \log n)$.

Problem 6. If functions $f(n) = O(n \log n)$ and $g(n) = O(\sqrt{n})$, then $f(n) + g(n) = \Omega(n \log n)$.

Problem 7. If functions $f(n) = \Theta(n \log n)$ and $g(n) = \Theta(\sqrt{n})$, then $f(n) + g(n) = \Theta(n \log n)$.