COMP3506/7505: Regular Exercise Set 2

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Problem 1. Prove $30\sqrt{n} = O(\sqrt{n})$.

Problem 2. Prove $\sqrt{n} = O(n)$.

Problem 3. Let $f(n)$, $g(n)$, and $h(n)$ be functions of integer n. Prove: if $f(n) = O(g(n))$ and $g(n) = O(h(n))$, then $f(n) = O(h(n))$.

Problem 4. Prove $(2n + 2)^3 = O(n^3)$.

Problem 5. Prove or disprove: $4^n = O(2^n)$.

Problem 6. Prove or disprove: $\frac{1}{n} = O(1)$.

Problem 7. Prove that if $k \log_2 k = \Theta(n)$, then $k = \Theta(n/\log n)$.