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Algorithms and Data Structures
Summer Term 2019
Exercise Sheet 2

Exercise 1: $\mathcal{O}$-Notation

Proof or disprove the following statements:

(a) $n \in \Theta(\log_2 3^n)$

(b) $2n \in \mathcal{O}(10\sqrt{n})$

(c) $8n^3 + 5n^2 \in \mathcal{O}(\frac{n^3}{2})$

Exercise 2: Sort Functions by Asymptotic Growth

Sort the following functions by asymptotic growth using the $\mathcal{O}$-notation. Write $g <_{\mathcal{O}} f$ if $g \in \mathcal{O}(f)$ *and* $f \notin \mathcal{O}(g)$. Write $g =_{\mathcal{O}} f$ if $f \in \mathcal{O}(g)$ *and* $g \in \mathcal{O}(f)$.

n^2	$\sqrt{n}$	2^n	$\log(n^2)$
3^n	n^{100}	$\log(\sqrt{n})$	$(\log n)^2$
$\log n$	$10^{100}n$	$n!$	$n \log n$
$n \cdot 2^n$	n^n	$\sqrt{\log n}$	n