Universität Siegen
Lehrstuhl Theoretische Informatik
Markus Lohrey

Exercise 4

Task 1 (Slide 77)
Let $n \in \mathbb{N}$. Show that the function $f(x) = \log_2(\log_2(n) - x)$ is concave on $(-\infty, \log_2(n))$.

Task 2

(a) Show that the leaves of a heap of size n are at positions

$$\lfloor n/2 \rfloor + 1, \lfloor n/2 \rfloor + 2, \ldots, n$$

of the array representation.

(b) How many comparisons does build-heap need on a sorted list?

(c) How many comparisons does build-heap need on a reversed sorted list?

Task 3
Sort the following list via Radixsort.

$$[224, 421, 319, 121, 914, 314]$$

Task 4
Show that the median of five numbers can be computed using six comparisons.

Task 5
Does the algorithm "Median of the Medians" run in linear time, if one uses blocks of three or blocks of seven?