

Problem sheet 8

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1.) Amortized Analysis

A sequence of operations is performed on a datastructure. The i -th Operation costs i if i is an exact power of two, and 1 otherwise.

- a) Use aggregate analysis to determine the amortized cost per operation. (1P)
- b) Repeat a) but use the accounting method instead.(1P)
- c) Repeat a) but use the potential method instead. (1P)

2.) In- and out-degrees

Given an adjacency-list representation of a directed graph, how long does it take to compute the out-degree of every vertex? How long does it take to compute the in-degrees? Explain your answer by giving the algorithm and its runtime. (3P)

3.) The **transpose** of a directed graph $G = (V, E)$ is the graph $G^T = (V, E^T)$, where $E^T = \{(v, u) \in V \times V : (u, v) \in E\}$. Thus, G^T is G with all edges reversed. Describe an efficient algorithm for computing G^T from G , both from the adjacency-list and the adjacency matrix representations of G . Analyze the runtimes of your algorithm.(3P)