ALDA SoSe 24 1st Exam

what was asked on the exam:

1. Adjacency Matrix A of a graph G:

   a) write the pseudocode for an optimal algorithm that determines the total number of nodes in the graph with equal in- and out-degrees.
   b) Analyze the complexity of your algorithm and prove optimality

2. Heaps

3. Hashing

   a) Open hashing. Insert a sequence of elements
   b) Open hashing. Delete a sequence of elements

4. Standard questions for comparing functions asymptotically, determining growth rate of reccurence relations with and without applications of the master theorem, analyzing complexity of short pseudocode algorithms like

```
read(t)
k := 1
i : = 1
while (k <= t) :
    i := i + 1
    k := k + i
```

5. Short proofs of statements regarding (a, b) trees and graphs

6. Simple proof by induction problem

7. Dijkstra shortest path algorithm

wasn't asked:

- sorting
- problems specifically for divide & conquer / recursion
- problems specifically for dynamic programming
- linear programming
- approximation / heuristic algorithms
- algorithms on strings