

Exercise Sheet 6 for Advanced Data Structures (Summer 2026)

Hand In: Until 2026-06-05 18:00, on ILIAS.

Problem 1

20 points

Consider using Dijkstra's algorithm for single source shortest paths in general graphs, versus in *planar* graphs specifically. (Recall that a graph is planar if it can be drawn in the plane without crossing edges.) As the size of the graph becomes large, which heap would you use to implement the algorithm?

Hint: How many edges can a planar graph have?

Problem 2

40 points

Give a data structure which maintains a (multi)set of elements, and can support the following operations. Below, let n denote the size of the set.

- Insert an element, in $O(\log n)$ time.
- Delete the minimum element, in $O(\log n)$ time.
- Given an index k , find the k -th smallest element in $O(k \log k)$.