PS Algorithms and Data Structures 2024

Task sheet 8

Task 22

Let $G = (V, E)$ be an undirected and unweighted graph. The diameter $D(G)$ of a graph is defined as

$$D(G) := \max_{u,v \in V} \delta(u, v).$$

That is, $D(G)$ is the length of the longest of the shortest paths between two nodes. Formulate an algorithm that calculates $D(G)$. What is the running time of your algorithm?

Task 23

Rewrite the depth-first search so that a stack is used instead of recursion.

Make sure that your approach sets the entries $u.d$ and $u.f$ of each node u to the same values as the depth-first search presented in the VO.

Task 24

Develop an algorithm with running time $O(|V| + |E|)$ that decides whether a given undirected graph $G = (V, E)$ is cycle-free.