

Homework assignment 1 - Turing Machines

Deadline: 25.10.2021, 12:20 in Moodle.

Problem 1. Design a Turing machine that moves its input one cell to the right: $u \rightarrow 0u$, where $u \in \Sigma^*$ and $\Sigma = \{0, 1\}$. Draw its transition graph. Can you construct such a machine so that it moves arbitrary input string $u \in (\Gamma \setminus \{\sqcup\})^*$?

Problem 2. Construct a Turing machine that copies its input: $u \rightarrow u\#u$, where $u \in \Sigma^*$ and $\Sigma = \{0, 1\}$. Draw its transition graph.

Problem 3. Describe an algorithm for a Turing machine, that gets as an input a description of a graph G given by the list of vertices and edges, and marks all vertices reachable from the first node.

Problem 4. Show how to simulate a Turing machine with a tape infinite in both directions by a Turing machine with a one-way infinite tape.