

# Computational Complexity

2018/2019

## Homework 2

In this homework we consider deterministic Turing machines that can use logarithmic memory and arbitrarily large stack. Formally, we can define them as machines with three tapes:

- the input tape, which is read-only,
- the working tape, which can be of size at most logarithmic in the length of the input, and
- the stack tape, with the restriction that if the head moves left, then the blank symbol is written (there is no size limit concerning the stack tape).

**Problem 2.1. (0.25 pt)** Prove that every language recognized by a deterministic Turing machine with logarithmic memory and arbitrarily large stack belongs to P.

**Problem 2.2. (0.25 pt)** Prove that every language from P is recognized by some deterministic Turing machine with logarithmic memory and arbitrarily large stack.

**Hint.** For every language in P there is a uniform sequence of circuits recognizing this language.