## **Exercise** 1

**Task 1.** Let f be an increasing function. Are the following statements correct? Give reasons for your answer.

- 1. Every f-time-bounded Turing machine is f-space-bounded.
- 2. Every f-space-bounded Turing machine is f-time-bounded.

**Task 2.** Let M be a deterministic finite automaton that accepts the formal language L(M). Find a Turing machine that also accepts L(M). Is this Turing machine f-space-bounded in terms of a function f?

**Task 3.** Give a formal definition of the relation symbol  $\vdash$  (slide 6 of the lecture).

Task 4. Prove statement 3 of Lemma 3 (slide 9).