

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. Let $f : \mathbb{N} \rightarrow \mathbb{N}$ be a monotone growing function

1. Show that $\text{DTIME}(f)$ is closed under union and intersection.
2. Is it true or not that $\text{DTIME}(f(n)) \subset \text{DSpace}(f(n))$? Give reasons for your answer.