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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 $f : \mathbb{N} \to \mathbb{N}$ be a monotone growing function

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