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Modern Complexity Theory

Spring 2005

Assignment 3

Problem 8 (2 points)**:**
Show that if L can be decided by a $t(n)$ time-bounded Turing machine, then L can be also decided by an $n + t(n)/2$ time-bounded Turing machine.

Problem 9 (4 points)**:**
Prove that $\lfloor \log n \rfloor$ is space constructible and that $n \cdot \lfloor \log n \rfloor$ is time constructible. (Provide Turing machine-like algorithms. You can use multiple tapes. Notice that the input can be any string of length n and that the output $f(n)$ has to be given in binary form.)

Problem 10 (2 points)**:**
In the lecture we showed that there is an infinite hierarchy for deterministic space. Show that one can also establish an infinite hierarchy for non-deterministic space.

Problem 11 (2 points)**:**
Show that BPP $\subseteq$ PSPACE. (Hint: Check the definition of probabilistic Turing machines in Section 1!)