Tutorial 10

JAIO - II

Question 1 (*toolbox* problem 146)**.** Show that one can design an algorithm for learning DFA without membership queries and counterexamples, which finds a correct DFA in exponential time. Can one do better?

Question 2 (*toolbox* problem 147)**.** Show that there is no algorithm, which asks only membership queries and guesses a correct DFA at the first time it asks an equivalence query. Can it be done with a fixed number of mistaken equivalence queries?

Question 3 (*toolbox* problem 148)**.** Show that there is no algorithm running in polynomial time, which learns a correct DFA in the following setting: both membership and equivalence queries are allowed, but in the case when answer for an equivalence query is "NO" Teacher delivers no counterexample.

Question 4 (*toolbox* problem 130)**.** Is the reverse function is not left-to-right sequential?

Question 5 (*toolbox* problem 131)**.** Which of the following functions over a unary alphabet are sequential?

1. $a^n \mapsto a^{n^2}$;
2. $a^n \mapsto a^{\lfloor \sqrt{n} \rfloor}$.

Question 6 (*toolbox* problem 132)**.** Is there is two-way deterministic transducer corresponding to the language $w \mapsto ww$? Is this language rational?