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Int 201: Decision Computation and Language
Tutorial 9

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Question 1. Show step by step processing of input string 01#01 on the Turing Machine M in Figure1, using configuration descriptions. i.e., start with $q_1$01#01. Note that $x \to R$ means, read x and move right without writing.

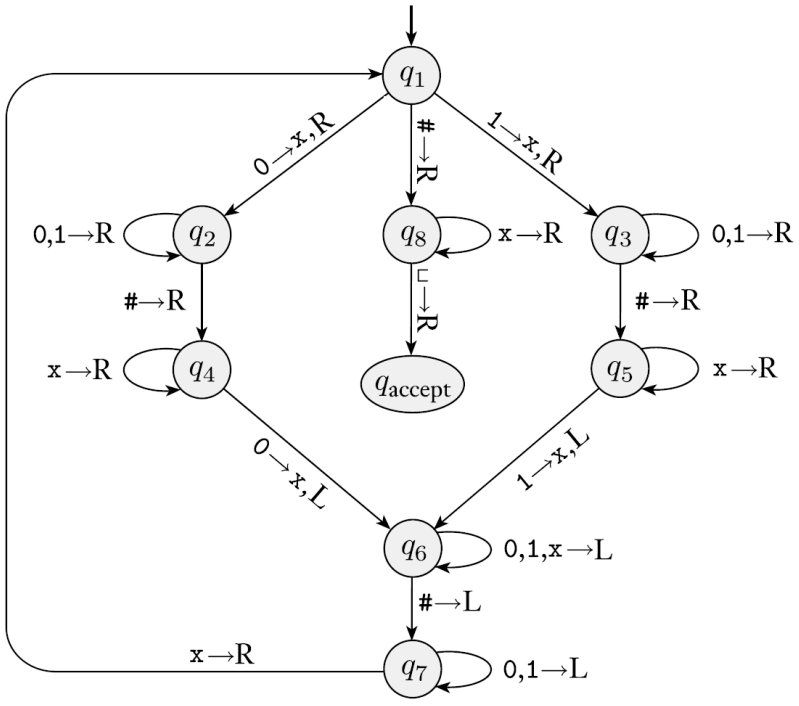

Figure 1: Turing Machine M

Question 2. Write down the set description of the language being accepted by the Turing Machine M in Figure1. Justify your answer.

Question 3. Is the Turing Machine M in Figure1 a decider (i.e., all inputs halt on M)? Justify your answer.

Question 4. Are all context-free languages Turing-decidable? Justify your answer.

Question 5.

$N =$ On input w

1. Check if $w \in a^*b^*c^*$, reject if not.
2. Count the number of a's,b's, and c's
3. Accept if all counts are equal; reject if not

Write down the set description of the language being accepted by the Turing Machine N of the above high-level descriptions.

Question 6. A queue automaton is like a push-down automaton except that the stack is replaced by a queue. Formally, see Introduction to Queue Automata.

Explain in high-level description how to simulate a TM with a queue automaton and vice versa. [1]

Question 7 (Optional)**.** Have fun with the notebook. https://github.com/ND-CSE-30151/spring-2024/blob/main/notes

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[1] As a corollary, a two-stack PDA can simulate a queue automaton, and therefore a two-stack PDA is equivalent to a Turing machine.