Automata Theory - Homework II

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1 Instructions

- 1. The homework is due on October 26, in class.
- 2. Each question is worth 2 points.
- 3. Attempt as many problems as you can. You will be given partial credit, as per the policy discussed in class.

2 Problems

- 1. Suppose that you are given the DFA D_L of a regular language L. Design an algorithm to check that L contains at least 50 strings.
- 2. A palindrome is a string that reads the same forwards and backwards. Let L_{pal} denote the set of palindromes over the alphabet $\Sigma = \{0, 1\}$. Is L regular?
- 3. In class, we partially proved that homomorphisms preserve regularity. In the inductive, stage, we only considered the case in which the regular expression E can be decomposed as F+G. Write the proof for the case in which $E = F \cdot G$.
- 4. Let L be a language over an alphabet Σ , such that $a \in \Sigma$. The language $Qot_a(L)$ is defined as the set of strings $w \in \Sigma^*$, such that $wa \in L$. Is $Qot_a(L)$ regular?
- 5. Given two regular languages L_1 and L_2 , how would you check if they have at least one string in common.