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 $\Sigma$, 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.