

University of Waterloo
CS 462 — Formal Languages and Parsing
Winter 2011
Problem Set 6

Distributed Wednesday, February 9 2011.

Due Wednesday, February 16 2011, in class.

All answers should be accompanied by proofs.

1. [10 marks] Is the Myhill-Nerode equivalence relation induced by a language L the same as the one induced by \overline{L} , the complement of L ? Explain.
2. [10 marks] Consider the following transformation on languages:

$$\mathbf{sqrt}(L) = \{x \in \Sigma^* : \text{there exists } y \in \Sigma^* \text{ such that } |y| = |x|^2 \text{ and } xy \in L\}.$$

Show that if L is regular, then so is $\mathbf{sqrt}(L)$. Hint: use the boolean matrix approach.

3. [10 marks] Show that if L is a regular language, then so is

$$\mathbf{ROOT}(L) = \{w : w^{|w|} \in L\}.$$

Hint: use the transformation automaton.