

Umeå University
Department of Computing Science

Language and Computation 7.5 p
5DV162

Assignment 1

Submitted
2016-09-16

Authors:
Lorenz Gerber (dv15lgr@cs.umu.se, lozger03@student.umu.se)

Instructors:
Henrik Björklund

Contents

1	Problem 1	1
2	Problem 2	1
3	Problem 3	1
4	Problem 4	1
	References	1

1 Problem 1

Assume that L is a regular language. Strings w of language L are constructed according to the specification where zero, one or several 'a's and zero, one or several 'b's are mixed freely as long as there are more 'b's than 'a's in it. Let's have a look at such a generic string and how it can be split into three parts xyz such that xy is shorter than m , x is 1 or larger and all $xyiz$ are part of L for all $i \in \mathbb{N}$. Independent of how m is chosen, if y contains more a than b, which according to the language definition is possible, the resulting strings for $xyiz$ $i \in \mathbb{N}$ are no longer part of L . Hence, proven by contradiction, L can not be a regular language.

2 Problem 2

Assume that L is a regular language. Strings w of language L are constructed according to the specification as a^n with n being a prime number equal or larger than 2. For every prime n , there has to be a number m which is smaller than n , and that multiplied with any natural number plus the difference of p and m will be a prime. Such a number does not exist. Hence, L can not be a regular language.

3 Problem 3

Conversion of context free grammar into Chomsky normal form:

$$S \rightarrow aAB$$

$$A \rightarrow aAa$$

$$A \rightarrow bb$$

$$B \rightarrow a$$

4 Problem 4

shuffle shuffle