

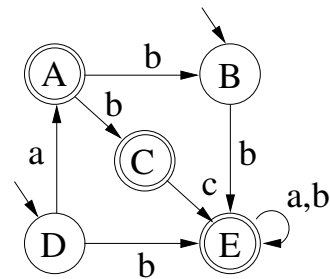
Formal Models SS 2015: Assignment 1

Institute for Formal Models and Verification, JKU Linz

Due 12.03.2015

Exercise 1

Given the finite automaton (FA) A_1 as shown on the right. Specify A_1 formally as a 5-tuple, including all of its components. Is $\epsilon \in L(A_1)$, $bbbabb \in L(A_1)$ and $babb \in L(A_1)$?



Exercise 2

Specify an automaton which describes the (simplified) structure of valid method signatures in Java-like programming languages according to following specification:

1. optional modifier `public`, `private`, `protected`
2. return type `void` or data type
3. method name
4. parameter list in brackets which can either be empty or which can contain multiple “data-type parameter-name”-pairs separated by a comma.

For simplification, we consider only data types `Object`, `int`, and `boolean`. Method names and parameter names are strings consisting of letters `a`, `b`, `c` and numbers `1`, `2`. The first symbol of a name is a letter. White spaces do not have to be considered.

Examples:

- `public void abc1 (Object a, boolean b)`
- `Object bb ()`

Exercise 3

Given an automaton over the alphabet $\{a, b, c\}$ which accepts the words of the language in which each a is followed by b and b is followed by an even number of c (at least by two c). Examples: ϵ , c, cc, abcc, cabcccc, abccabcc, ...

Specify this automaton graphically and as 5-tupel.

Exercise 4

Let $P_3 := A_3 \times A_4$ be the product automaton of FA A_3 and FA A_4 as shown on the right. Draw P_3 and fully specify it formally as a 5-tuple. Find three words w with $w \in L(P_3)$. What is the maximum number of states P_3 can have in theory? Justify your answers.

