Software-Modellierung und Verifikation
Informatik 2
Prof. J.-P. Katoen
RWTH Aachen

Priv.-Doz. T. Noll noll@cs.rwth-aachen.de
D. Klink klink@cs.rwth-aachen.de

0. Exercise sheet *Compiler Construction 2008*

This sheet will not be corrected.

Exercise 0.1:

The rational numbers are given as $\mathbb{Q} = \{\frac{m}{n} \mid m \in \mathbb{Z}, n \in \mathbb{N}^+\}$. E.g. the *strings* $-1/2$, $0/4$ and $+5$ represent elements in $\mathbb{Q}$, however 007 and 03/08 are not to be interpreted as rational numbers as for the leading 0's.

a) Give a regular expression describing $\mathbb{Q}$.

b) Give an NFA recognizing the elements of $\mathbb{Q}$ (and nothing else).

c) Construct a DFA from the NFA devised in b).

Exercise 0.2:

Consider the following grammar:

$$\begin{array}{lcl} S & \rightarrow & A \mid C \\ A & \rightarrow & a + S \mid b \\ C & \rightarrow & S * c \mid b \end{array}$$

a) Find all derivations of $a + b * c$.

b) Give the language defined by the grammar.

c) Find an equivalent grammar in Greibach normal form (without formal proof).

d) Construct a push-down automaton recognizing the language.

e) Give one run in the push-down automaton from c) accepting $a + b * c$.