Université de Fribourg
Universität Freiburg

Département de Mathématiques
Mathematik Departement

Mathematical Methods for Computer Science II

Spring 2021

Series 6 – Hand in before Monday, 19.04.2021 - 12.00

1. In this problem we consider the alphabet consisting of one single symbol 0. Thus a word is uniquely determined by its length.
   a) Construct a DFA that accepts words whose length is divisible by 2 or 3.
   b) Construct an NFA that accepts words of length n such that n dollars can be changed with bills of 3 and 7 dollars.

2. Construct DFAs accepting the following languages in the binary alphabet.
   a) The set of all words ending in 00.
   b) The set of all words (of non-zero length) whose first and last letter coincide.

3. Consider the alphabet made of all digits $0-9$ and all Latin letters $a-z$. Construct DFAs accepting the following languages.
   a) Words with at least one letter and at least one digit.
   b) Words with at least four symbols.
   c) Words with at least four symbols, among them at least one letter and at least one digit.

4. Construct a DFA equivalent to the NFA $(\{p,q,r,s\},\{0,1\},\delta,p,\{s\})$, where δ is given by the following table:

	0	1
p	p,q	p
q	r	r
r	s	$\varnothing$
s	s	$\varnothing$

5. Let L be the set of all binary words whose third symbol from the right is 1. Construct an NFA with four states that accepts the language L.