

Finite Automata Theory and Formal Languages

TMV027/DIT321 – LP4 2018

ϵ -NFA and RE

Assignment 3 – Deadline: Sunday 22nd of April 23:59

Assignments should be done and submitted individually!

For obtaining full points the answers should contain enough explanation/description so that they are easy to understand.

- (2.75pts) Convert the following ϵ -NFA into a DFA by using the method explained in class (please keep the names of the states to facilitate correction):

	ϵ	0	1
$\rightarrow q_0$	\emptyset	$\{q_1\}$	$\{q_0, q_2\}$
q_1	$\{q_2\}$	$\{q_4\}$	$\{q_3\}$
q_2	\emptyset	$\{q_1, q_4\}$	$\{q_3\}$
q_3	$\{q_5\}$	$\{q_4, q_5\}$	\emptyset
q_4	$\{q_3\}$	\emptyset	$\{q_5\}$
$*q_5$	\emptyset	$\{q_5\}$	$\{q_5\}$

- (1.5pts) Let Σ be $\{0, 1\}$. Use your intuition and give a NFA without ϵ -transitions which recognises the language generated by the regular expression $(0 + 01^*)^*(\epsilon + 1)1(\epsilon + 0 + 1)^*$.

- (1.25pts) Define a regular expression generating the language over the alphabet $\{0, 1\}$ where words start and end with a 1, have a length of at least two and where every 0 in the word is immediately followed by at least a 1.

Example of accepted words: 1010111, 1101, 1011010111, 11

Example of non accepted words: 10011, 100011

- Consider the following DFA, where “-” indicates no possible movement for the input:

	0	1	2
$\rightarrow q_0$	q_0	q_1	q_2
q_1	-	q_3	q_2
q_2	-	q_1	q_4
q_3	q_4	-	q_3
$*q_4$	-	q_4	-

Construct the regular expression that corresponds to the DFA above by

- (2.25pts) Eliminating states: eliminate first q_3 , then q_2 , and finally q_1 ;
- (2.25pts) Solving equations: solve and eliminate E_4 , then solve and eliminate E_3 , eliminate E_2 , solve and eliminate E_1 , finally solve E_0 .

Show enough information in the process so we can follow what you do.