

Solution to Homework Problem 18

Homework Problem 18. Use the general algorithm to transform a finite automaton from Problem 3 into a Turing machine. Show step-by-step, on an example of a word AAA , how this word will be recognized by your Turing machine.

Automaton from Problem 3: reminder. This automaton has two states: s and e ; s is the starting state, it is also the final state. The only two symbols are A and B . From s , AA leads back to s , and B leads to e . From e , any symbol leads back to e .

Solution. Here are the rules for the Turing machine:

start, $- \rightarrow R, s$
 $s, A \rightarrow R, s$
 $s, B \rightarrow R, e$
 $e, A \rightarrow R, e$
 $e, B \rightarrow R, e$
 $s, - \rightarrow \text{accept}$
 $e, - \rightarrow \text{reject}$

Tracing.

_	A	A	A	-	...	start
-	<u>A</u>	A	A	-	...	s
-	A	<u>A</u>	A	-	...	s
-	A	A	<u>A</u>	-	...	s
-	A	A	A	_	...	accept