

Solution to Homework Problem 18

Homework Problem 18. Use the general algorithm to transform a finite automaton from Problem 4 into a Turing machine. Show step-by-step, on an example of a word 101, how this word will be recognized by your Turing machine.

Automaton B from Problem 4: reminder. This automaton has two states: a and b, a is the starting state and both a and b are final states. The only two symbols are 0 and 1. From a, 0 leads to a, and 1 to b. From b, both 0 and 1 lead to a.

Solution. Here are the rules for the Turing machine:

start, $- \rightarrow R, a$

a, 0 $\rightarrow R, a$

a, 1 $\rightarrow R, b$

b, 0 $\rightarrow R, a$

b, 1 $\rightarrow R, a$

a, $- \rightarrow \text{accept}$

b, $- \rightarrow \text{accept}$

Tracing.

<u>-</u>	1	0	1	-	...	start
-	<u>1</u>	0	1	-	...	a
-	1	<u>0</u>	1	-	...	b
-	1	0	<u>1</u>	-	...	a
-	1	0	1	<u>-</u>	...	b
-	1	0	1	-	...	accept