

Solution.

The diagrams are given as a table. Each column corresponds to an input symbol, and each cell describes the written symbol (if changed), the movement (L or R or nothing when we reach a final state) and where the transition goes (if the state changes). The states correspond to capital letters (A, B, C, \dots) and the initial state is always A .

Exercise 1.

	0	1	\sqcup
A	R	R, B	reject
B	R, A	accept	reject

Exercise 2.

	0	1	x	\sqcup
A	$\rightarrow x, R, B$	$\rightarrow x, R, C$	R	reject
B	R	$\rightarrow x, L, D$	R	reject
C	$\rightarrow x, L, D$	R	R	accept
D	L	L	L	R, A

Exercise 3.

	0	1	\sqcup
A	$\rightarrow 1, \text{accept}$	$\rightarrow 0, L, B$	reject
B	$\rightarrow 1, \text{accept}$	$\rightarrow 0, L$	$\rightarrow 1, \text{accept}$

Exercise 4.

	0	1	x	y	\sqcup
A	R	R	$\rightarrow y, L, B$	R	L, C
B	$\rightarrow 1, R, A$	$\rightarrow 0, L$	L	L	$\rightarrow 1, R, A$
C	accept	accept	$\rightarrow \sqcup, L$	$\rightarrow \sqcup, L$	reject

Exercise 5 (busy beaver).

	0	1
A	$\rightarrow 1, R, B$	L, B
B	$\rightarrow 1, L, A$	done

	0	1
A	$\rightarrow 1, R, B$	done
B	R, C	R
C	$\rightarrow 1, L$	L, A

	0	1
A	$\rightarrow 1, R, B$	L, C
B	$\rightarrow 1, L, A$	R
C	$\rightarrow 1, L, B$	done