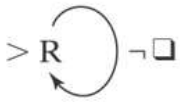
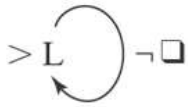
Useful machines



Find the first blank square to the right of the current square. $R_{\square}$



Find the first blank square to the left of the current square. $L_{\square}$

Find the first nonblank square to the right of the current square. $R_{\neg\square}$

Find the first nonblank square to the left of the current square $L_{\neg\square}$

L_a Find the first occurrence of a to the left of the current square.

$R_{a,b}$ Find the first occurrence of a or b to the right of the current square.

$L_{a,b}$ —a→ M_1
b ↓
M_2

Find the first occurrence of a or b to the left of the current square, then go to M_1 if the detected character is a; go to M_2 if the detected character is b.

$L_{x \leftarrow a,b}$ Find the first occurrence of a or b to the left of the current square and set x to the value found.

$L_{x \leftarrow a,b} Rx$ Find the first occurrence of a or b to the left of the current square, set x to the value found, move one square to the right, and write x (a or b).

Turing Machines as Language Recognizers

M ***decides*** a language $L \subseteq \Sigma^*$ iff:
For any string $w \in \Sigma^*$ it is true that:
if $w \in L$ then *M* accepts *w*, and
if $w \notin L$ then *M* rejects *w*.

A language *L* is ***decidable*** iff there is a Turing machine *M* that decides it. In this case, we will say that *L* is in ***D***.