Problem

A ***Turing machine with left reset*** is similar to an ordinary Turing machine, but the transition function has the form

$$\delta: Q \times \Gamma \longrightarrow Q \times \Gamma \times \{\mathrm{R}, \mathrm{RESET}\}.$$

If ? (q, a) = (r, b,RESET), when the machine is in state q reading an a, the machine's head jumps to the left-hand end of the tape after it writes b on the tape and enters state r. Note that these machines do not have the usual ability to move the head one symbol left. Show that Turing machines with left reset recognize the class of Turing-recognizable languages.

Step-by-step solution

Step 1 of 2

To show the Turing machine with left reset, recognize the class of Turing recognizable class of language.

• It must be shown that it can simulate ordinary Turing machine.

• Let *M* be an ordinary Turing machine and M_L be the Turing machine with left reset.

• M_L simulates *M* in the following way.

• When *M* makes a right transition then M_L follows it in the same way as *M* do.

• When *M* makes a left transition with symbol *a*, *b* in *M*, M_L replaces it with *A* or *B* respectively. So, the alphabet set $\sum M_L = \sum MU\{A, B\}$ and does a left RESET.

• Shifts all content of the tape by one position to the right for all symbols other than $\{A, B\}$.

Comment

Step 2 of 2

The above process is repeated until all content of the tape are shifted to the right and does the following.

• M_L does a RESET again.

• All right transitions are checked.

• Whenever it reaches to some $\{A, B\}$, it works in the same way as *M* does.

Comment