

Languages and Machines

Exercises Chap 9: 1, 2, 4, 7(a), 10

1

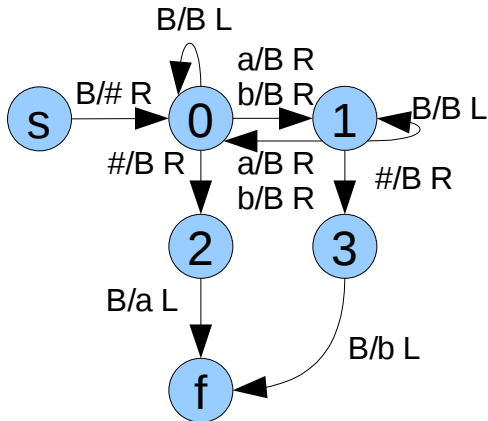
a

>E--B/BR-->0--B/aR-->1--B/aR-->2--B/aL-->f--

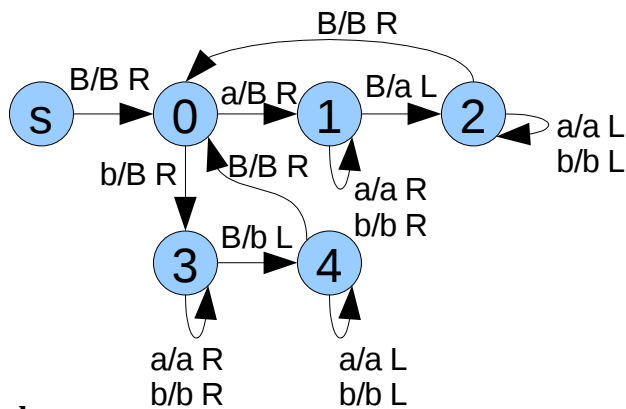
$$\hat{} \mid a/a \text{ L}$$

—

(This is supposed to be a loop)

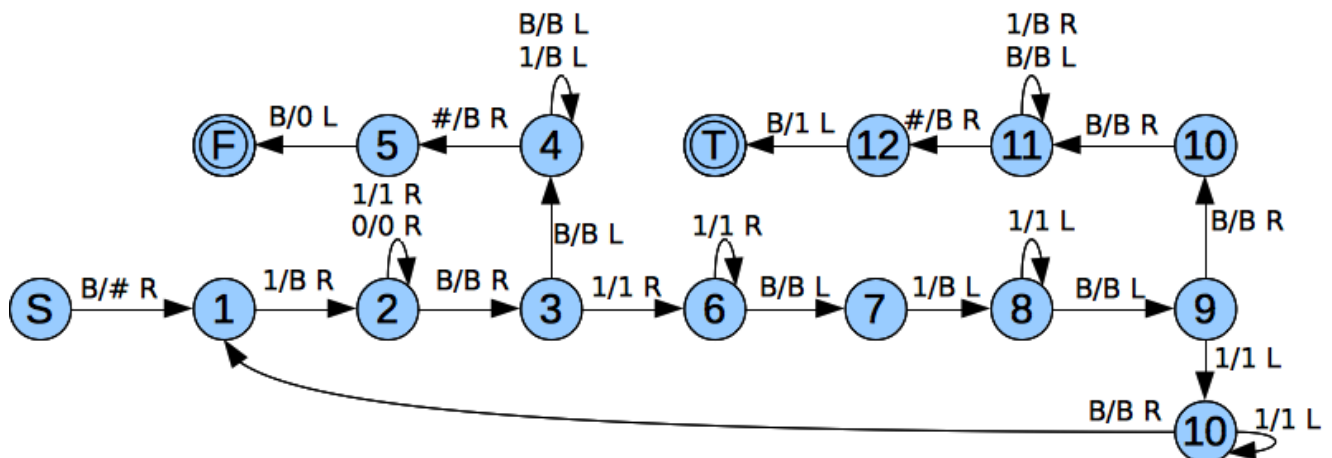
b

C



d

This is my lt function from the final -- the greater than machine would use a similar design:



2

What is a “partial characteristic function”? If it means that it does not return 0/1 and we want it to return 0/1, then we simply check to see if there are blanks or u to the right.

4**a)**

By the definition of recursive languages, all languages that are accepted by halting are recursive. Since X_L by definition prints a 1 or 0 and halts at the beginning for all strings w of L , then L is recursive.

b)

If L is recursive, then by definition we know that the TM halts for all input strings. We can convert the recursive TM to X_L by using the theorem to convert a halting TM to a final state TM. The failure state will erase all input and return a 0, while the final state will erase all input and return a 1.

7**a**

Move right, write 111, Move left, MULT, move right, write 1111, move left, ADD

10**a**

$(N \times N) \rightarrow N$

b

$(N \times N) \rightarrow N$

c

$(N \times N \times N) \rightarrow N$

d

$N \rightarrow N$