

Q 3.11

A TM with doubly inf. tape...

Show that this TM is not more expressively powerful than a standard TM.

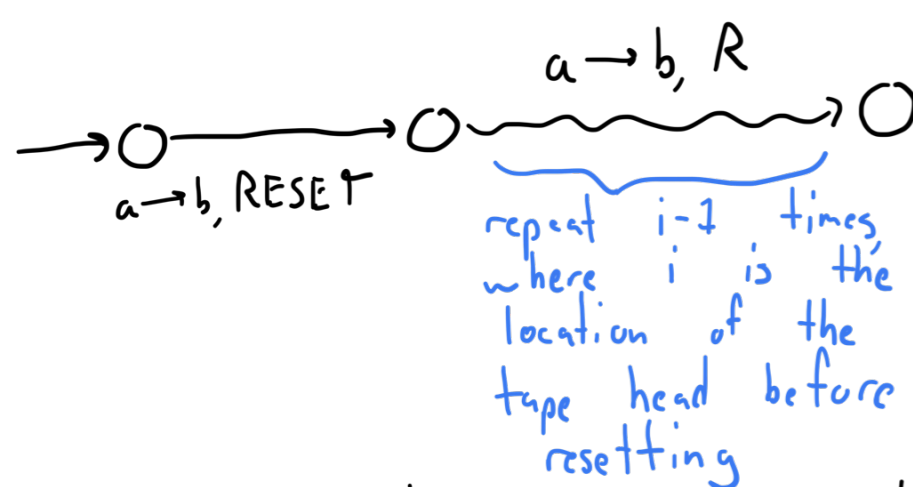


Proof: Let S a standard TM.
we will show that S can simulate a doubly inf. tape
If the tape head of S ever attempts to go left at index 0 (marked with a unique #) then shift all other symbols to the right by 1 and place the tape head back on index 0.

Q 3.12

We have a TM without an L transition. Instead, it can RESET and go to index 0. Show this TM is Turing-complete.

Proof: In order to go left by 1 (simulating that operation in a standard TM), we do the following:



We can store indices using binary between the symbols of the tape.

Q 4.14

Show that $\{\langle G \rangle \mid G \text{ is a CFG over } \{0,1\} \text{ and } 1^* \cap L(G) \neq \emptyset\}$

$T =$ "On input $\langle G \rangle$.

1. Construct CFG H s.t. $L(H) = 1^* \cap L(G)$.

2. Test whether $L(H) = \emptyset$ using the decider R given by Theorem 4.8.

3. If R accepts, **accept**
Otherwise, **reject**