A TM for $\{ xcx \mid x \in \{a,b\}^* \}$

$a^n b a^n$

abbcabb

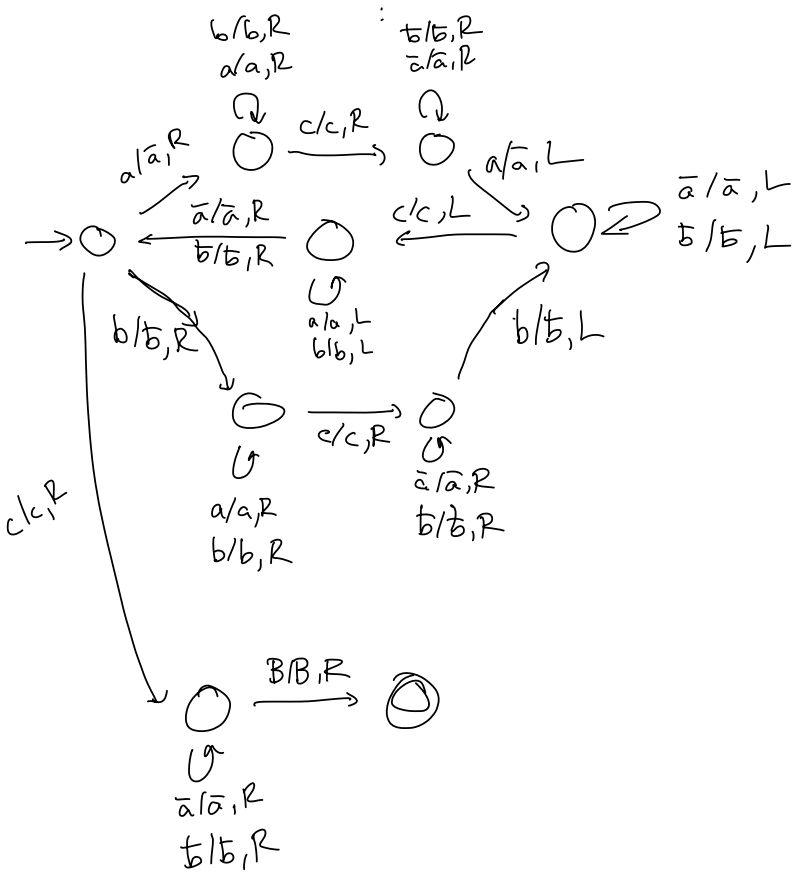
$\bar{a}$bbcabb

$\bar{a}$bbc$\bar{a}$bb

$\bar{a}\bar{b}$bc$\bar{a}$bb

$\bar{a}\bar{b}$b c $\bar{a}\bar{b}$b ⟶ $\bar{a}\bar{b}\bar{b}$c$\bar{a}\bar{b}\bar{b}$

Two branching paths:
if we marked a
vs if we marked b.



A TM for $\{ x \in \{a,b\}^* \mid x = x^R \}$

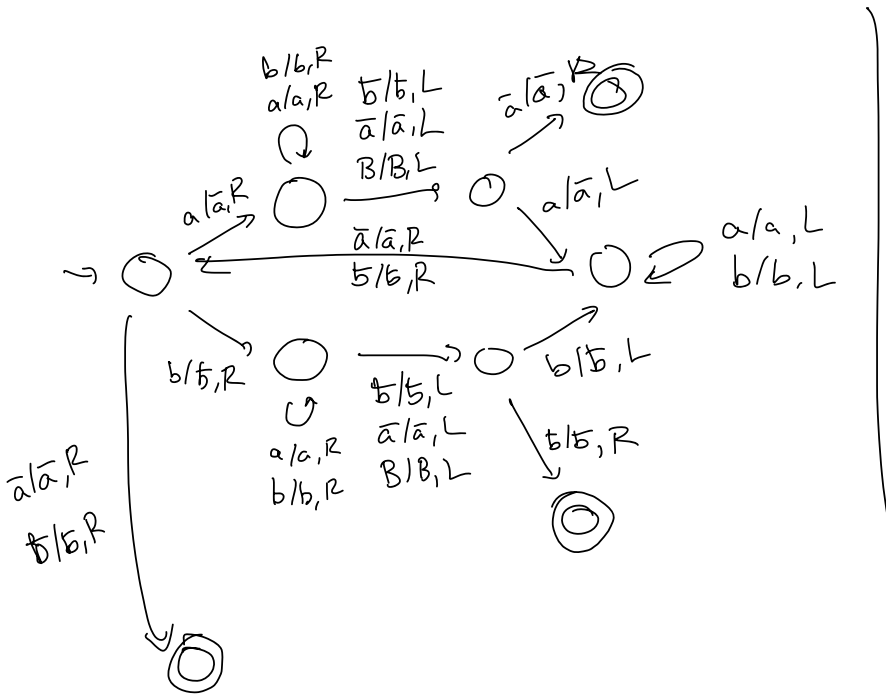
abababa

$\bar{a}$babbaba

$\bar{a}$ba bbab$\bar{a}$ ⟶

$x = x^R$

$\bar{a}\bar{b}a\bar{b}\bar{b}\bar{a}\bar{b}\bar{a}$



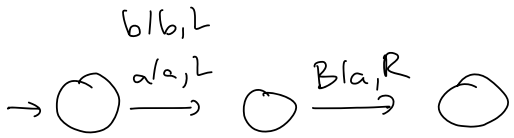
ābaba
↑

Turing Computable Functions

Typical TM just accepts or rejects,

but we can view the tape at the end as an output string - an answer.

Ex



not for accepting/rejecting

it starts with a string, and does something to it.

input: bbbab

output: abbbab

The TM adds an a to the beginning, then halts.

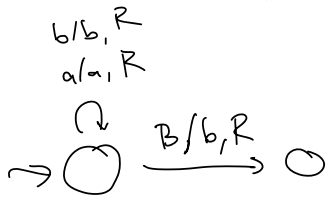
This TM is the same as the function

$f: \{a,b\}^* \to \{a,b\}^*$

$$f(x) = ax$$

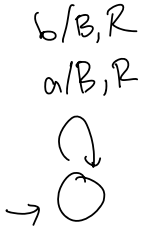
If some function f can be performed by a TM, we say f is Turing Computable

How bout $f(x) = xb$



Try $f(x) = axb$

$f(x) = \Sigma$



axb: