CS331 Cahlen Brancheau
HW 7

181

53)

1) Scan string from beginning to end removing every other a. ✓
2) if only one a remains accept.
3) if more than one a remains and #a's is odd, reject. ✓
4) Move head back to the beginning
5) goto 1

90

found the solution to this is class notes for a different university, read until I understood and wrote solution with out the notes.

56)

Let M_0 decide A
Let M_1 decide B
$L(M) = A \cup B$

on input x;

1) run M_0 on x, if M_0 accepts x, M accepts, else goto 2
2) run M_1 on x, if M_1 accepts x, M accepts. else M rejects x.

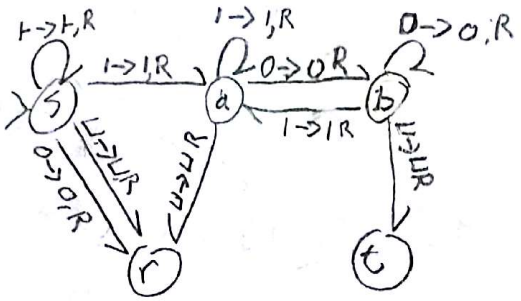
M accepts x $\Leftrightarrow$ M_0 accepts x or M_1 accept x.

why does this work?

15/20

5 0)

$1(1+0)^*0$



TM $M = (Q, \Sigma, \Gamma, \vdash, \sqcup, \delta, s, t, r)$

Where

$Q = \{s, a, b, r, t\}$,

$\Sigma = \{0, 1\}$,

$\Gamma = \Sigma \times \{\vdash, \sqcup\}$

$\vdash \in \Gamma - \Sigma$, Left end marker

$\sqcup \in \Gamma - \Sigma$, blank symbol

$s \in Q$, start state

$t \in Q$, accept state

$r \in Q$, reject state

$\delta =$

20

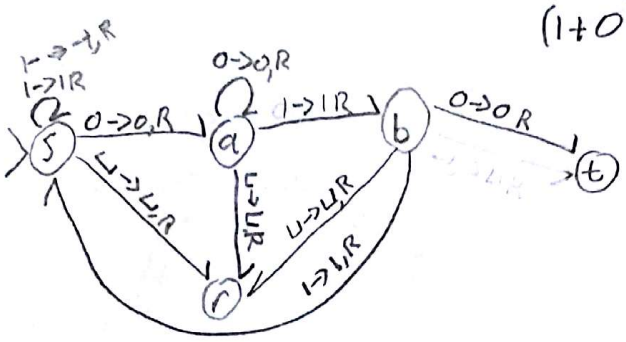
	⊢	0	1	⊔
s	(s, ⊢, R)	(r, -)	(a, 1, R)	(r, -)
a	—	(b, 0, R)	(a, 1, R)	(r, -)
b	—	(b, 0, R)	(a, 1, R)	(t, -)
r	—	(r, -)	(r, -)	(r, -)
t	—	—	—	(t, -)

— = not possible

- = any thing.

51)

$(1+0)^*010(1+0)^*$



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where

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$\Sigma = \{0, 1\}$

$\Gamma = \Sigma \times \{\vdash, \sqcup\}$

$\vdash \in \Gamma - \Sigma$, left end marker

$\sqcup \in \Gamma - \Sigma$, blank space symbol

$s \in Q$, start state

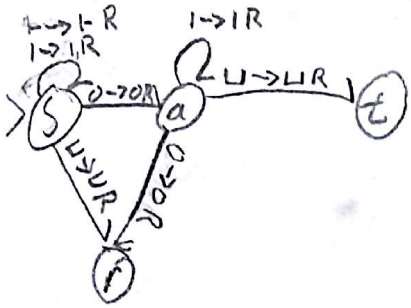
$r \in Q$, reject state

$t \in Q$, accept state

$\delta =$

	$\vdash$	0	1	$\sqcup$
s	(s, ⊢, R)	(a, 0, R)	(s, 1, R)	(r, -, -)
a	—	(a, 0, R)	(b, 1, R)	(r, -, -)
b	—	(t, -, -)	(s, 1, R)	(r, -, -)
r	—	←	←	(r, -, -)
t	—	(t, -, -)	(t, -, -)	(t, -, -)

52) 1^*01^*



TM $M = (Q, \Sigma, \Gamma, \vdash, \sqcup, \delta, s, t, r)$

where

$Q = \{s, a, t, r\}$

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$\vdash \in \Gamma - \Sigma$, Left end marker

$\sqcup \in \Gamma - \Sigma$, blank symbol

$s \in Q$, start state

$r \in Q$, reject state

$t \in Q$, accept state

$\delta =$

	$\vdash$	0	1	$\sqcup$
s	(s,⊢,R)	(a,0,R)	(s,1,R)	(r,-,-)
a	—	(r,-,-)	(a,1,R)	(t,-,-)
r	—	(r,-,-)	(r,-,-)	(r,-,-)
t	—	—	—	(t,-,-)

54)

1) Scan string and place ⊣ on the right end
2) if #à's is 1 accept
3) move head Left and replace last a with $\dot{x}$
4) Scan Left to ⊢ replacing all a's with à
5) Scan Left to right
   5.1) if à is scanned write $\tilde{a}$
      5.1.1) move head to ⊢ and write a
      5.1.2) move head right and write ⊣
      5.1.3) move head to ⊢
      5.1.4) goto 5
   5.2) if $\dot{x}$ is scanned write $\tilde{x}$
      5.2.1) goto 5.1.1
   5.3) if a is scanned, scan Left
      5.3.1) if $\tilde{x}$ is scanned write $\dot{x}$
      5.3.2) if $\tilde{a}$ is scanned write à
      5.3.3) if ⊢ is scanned, move head right
         5.3.3.1) if $\dot{x}$ is scanned write a
            5.3.3.1.1) scan right to first a replacing any symbols read with a
            5.3.3.1.2) accept.
         5.3.3.2) if à is scanned
            5.3.3.2.1) scan to first $\dot{x}$
            5.3.3.2.2) move head Left, write $\dot{x}$
            5.3.3.2.3) scan to ⊢
            5.3.3.2.4) goto 5

Ex:

⊢aaa␣␣....
⊢aa a⊣
⊢a a $\dot{x}$⊣
⊢à à $\dot{x}$⊣
⊢$\tilde{a}$à $\dot{x}$⊣
⊢$\tilde{a}$à $\dot{x}$ a⊣
⊢$\tilde{a}\tilde{a}\dot{x}$ aa⊣
⊢$\tilde{a}\tilde{a}\tilde{x}$ aaa⊣
⊢à à $\dot{x}$ aaa⊣
⊢à $\dot{x}$ $\dot{x}$ aaa⊣
⊢$\tilde{a}$ $\dot{x}$ $\dot{x}$ aaa a⊣
⊢$\tilde{a}$ $\hat{x}$ $\dot{x}$ aaa aa⊣
⊢$\tilde{a}$ $\tilde{x}$ $\hat{x}$ aaa aaa⊣

⊢à $\dot{x}$ $\dot{x}$ aaa aaâ⊣
⊢ $\dot{x}$ $\dot{x}$ $\dot{x}$ aaa aaa⊣
⊢a $\dot{x}$ $\dot{x}$ aaa aaa⊣
⊢a a $\dot{x}$ aaa aaa⊣
⊢aaa aaa aaa⊣

49) I dont know 6/20

55) I dont know