

## OUTLIMS:

- TM
  - VARIANT
  - BSURCIZI
- 

TM  $\rightarrow$  MODELLO DI  
CALCOLO

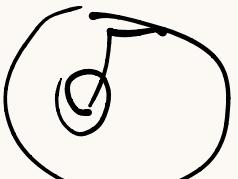
- NASPRO COMB  
MEMORIA ILLIMITATA

- TESTINA

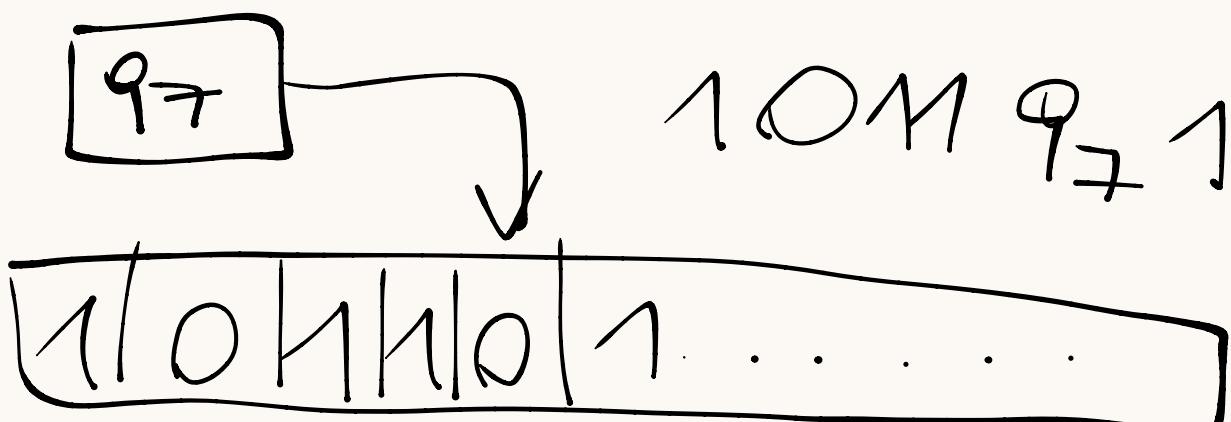
$\rightarrow$  INPUT

$\rightarrow$  SE COSTRUI SOL  
NA SPO

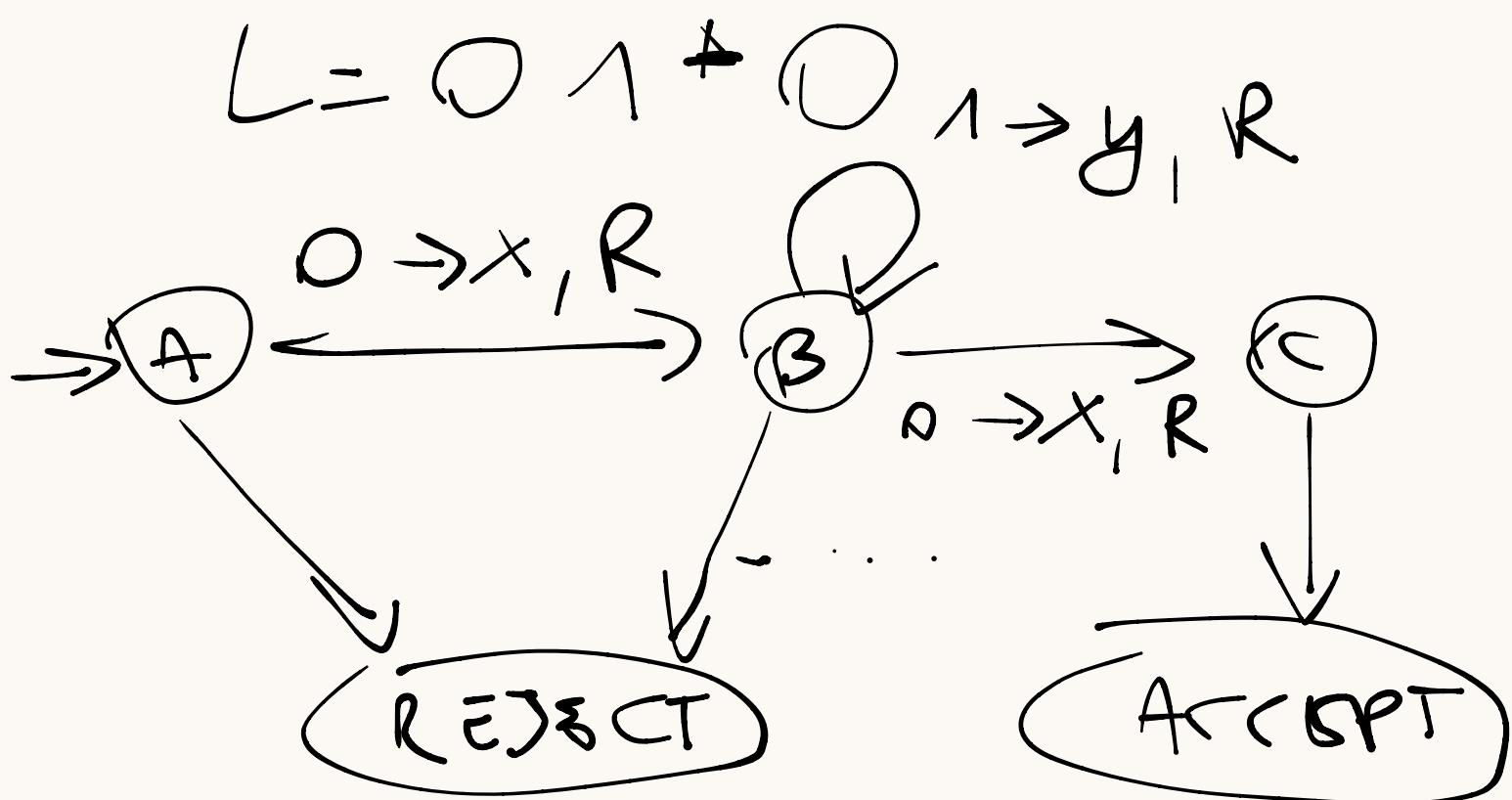
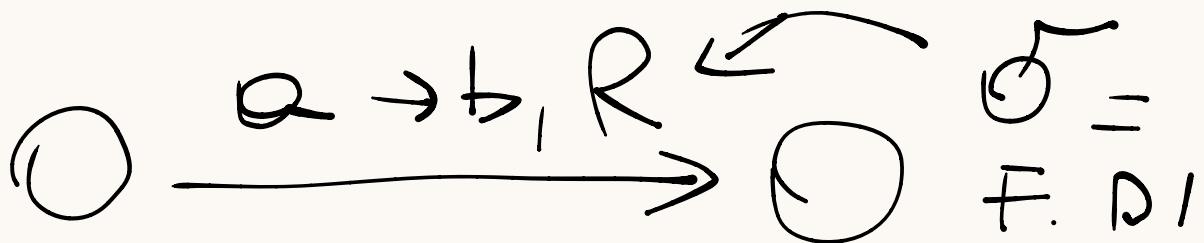
$(Q, \Sigma, \Gamma, \delta, Q_0, Q_A, Q_R)$   
 ↑      ↑      ↗  
 SIAA ALFABETO NA SIMB

 → FUNZIONE  
 DI TRANSIZIONI

$\delta: Q \times \Gamma \rightarrow Q \times \Gamma \times \{L, R\}$   
 ↗  
 ES. F. TRANS.  
 COMPUTA



(TURINGMACHING. 10)



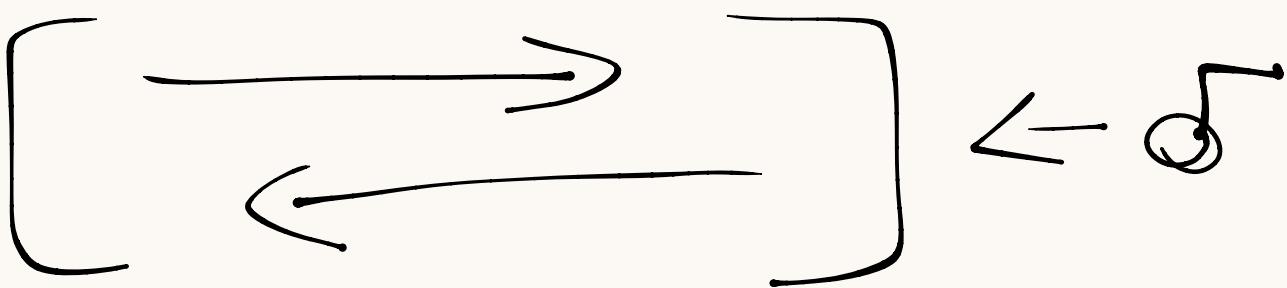
$\Rightarrow \delta(Q, X) = (P, Y, D)$   
 $T \quad T \quad T$   
 INP. FVN. DR.  
 INPUT FUNC.

# ① DESCRIPT. IMPLEMENTAZIONA

ES.

$$L = B = \{0^n 1^n 2^n \mid n \geq 0\}$$

## - DESCRIPT. IMPLEMENTAZIONA

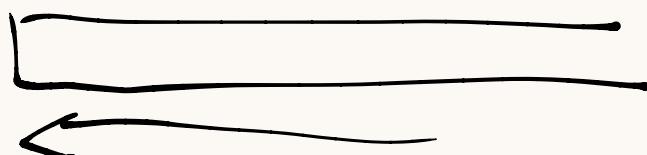


TM  $M \rightarrow$  STRINGA "m"

① SCAN INPUT FROM SX

→ DX

② RITORNA FISICA A  
FINE DEL NASSO



③ RIPETIZIONE FIN CHIUSO  
NON CI SONO PIÙ 0

④ SCAN FIN CHIUSO E "1"

- - . → ANCHÉ POS  
"2"

PLACEHOLDER

↑ " "

SIMBOLI QUALSIASI

POS TRACKARE DUE  
FINI AM

→ O □

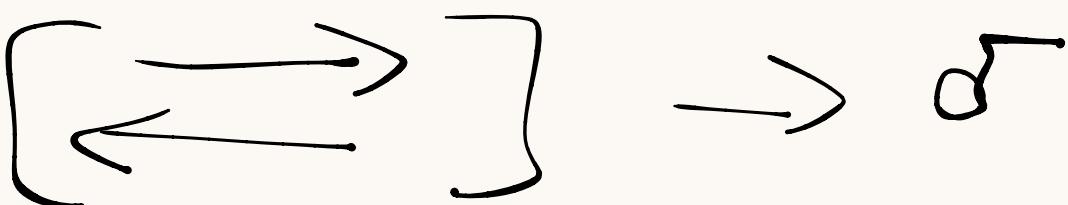
→ CONSEGUENZA.

D10, 1, 2)

→ TM ACCETTA /  
O RIFIUTA

$L = \{ w \in \{a,b\}^* \mid$

w contiene almeno "a"  
Quante "b" }



① MATCH TRA  $\#$  e  $a$

$e \neq b$

② Num.  $\# = n \cdot \{a,b\}^*$

OPPURE

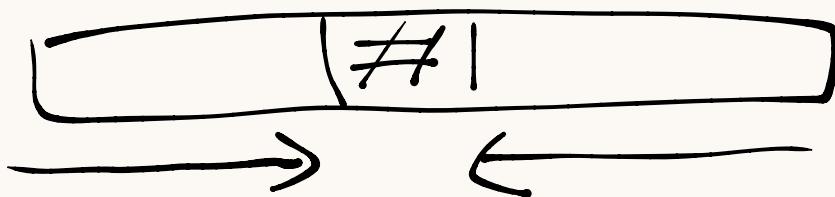
$\Rightarrow \overbrace{\text{e } a \text{ } a/b \text{ } b/b}^{\dots \square \square \square}$

$\Rightarrow \delta \rightarrow \text{AGGIUNGB}$   
 $\text{SINGOLI}$

$L = \{ w \# w^R \mid$   
 $w \in \{a, b\}^*\}$

① MARCO 1°  $\alpha$ .

② UNTIL "U"



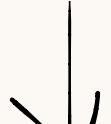
ALGORITMO

① FROM SX TO DX

② MARK ALL SYMBOLS  
INITIALS

③ ARRIVED IN RONDO  
< TWO WORDS  
SYMBOLS

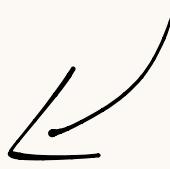
④ RETURN YES  $\rightarrow w \# w^R$   
ELSE  $\rightarrow$  MISMATCH



$M_{BAD} = "SU INPUT P"$

→ PAU NO PO SU VAR.

$x_1 \dots x_k$



① PROVA TUTTE LE  
COMBINAZIONI DI  
INTERI DI  $x_1 \dots x_k$

② VAUTTO TUTTI LI  
CONFIG. DI P

③ SG È CONFIG.

CHE VALGONO, ACCORDA  
ALMUNISMO, RIFUTA

$$[x^2 + x + 3]$$

→ DESCR. NON VACUA

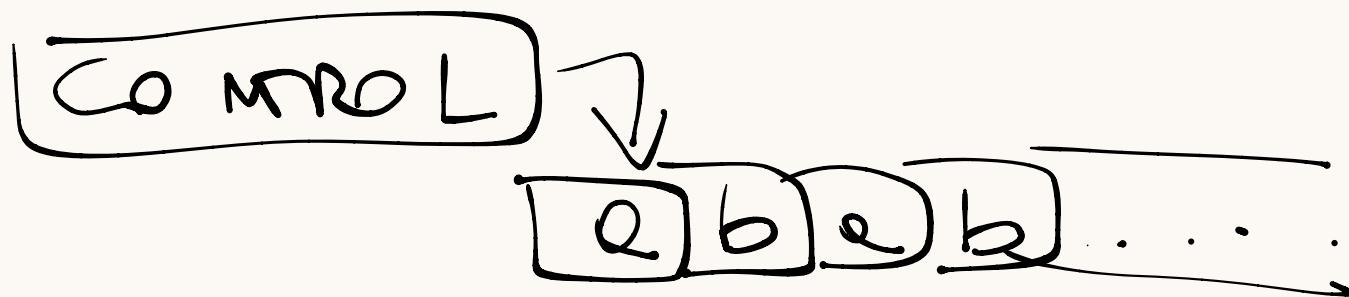
RISP → PORTABILE

ANDARE AVANTI SENZ'PIÙ

→ NO N' SA PRIMO DERIMMO  
"REGOLI"

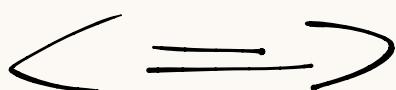
## VARIANTE DI TM

- TM A NASMO  
SIGNI - INFINTA



+  $\infty$  (D)

DI MOLTISSIME SIGNI



TM SIGNI - INFINTA /  
TM. NASMO SWGOW  
(B VI CENSURA)

① SENI - /NFINDO

→ TR "Q" IV.

NASMO SWGOS

$S = w_1 \dots w_k$

#  $w_1 \dots w_m \#$

• ① PUMANO CON

NUMS LISS AS STRINGS

② COPIANO LA COMPUT.

PAR TIENDO CALL 'ULTRA' '#'

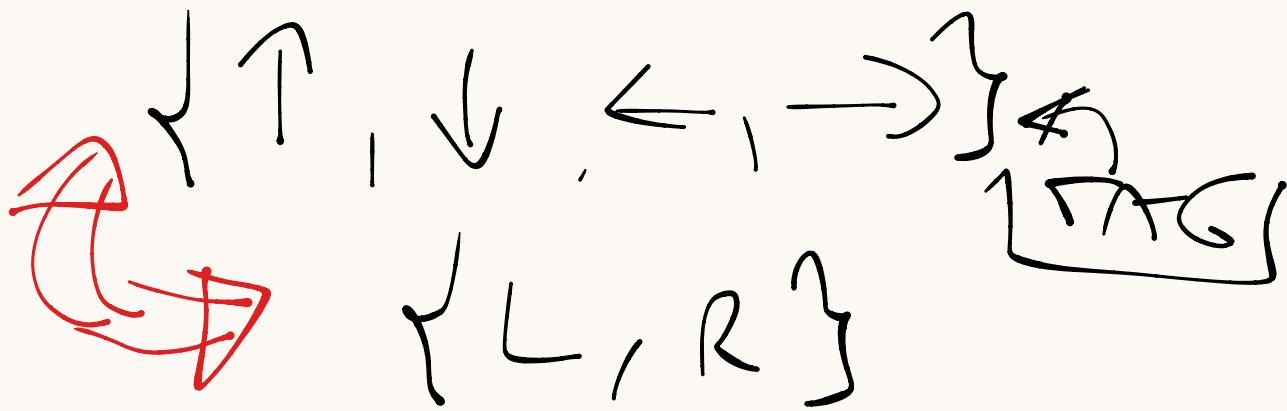
③ SEÑO "ALLARGANDO"

IN MAS FINO

LA COMPUT. FINO ALA FIN



VARIANTS TR A → Arcano  
N. SWGOS



② MULTINASMO

TM LEFT-T-RIGHT

$\delta: Q \times \Gamma \rightarrow Q \times \Gamma \times \{R, \text{REJECT}\}$

$TM_{LR} \iff TM ?$

① TM SW GOLD

$\delta(R, e) \rightarrow \text{NOV.}$

METHODS

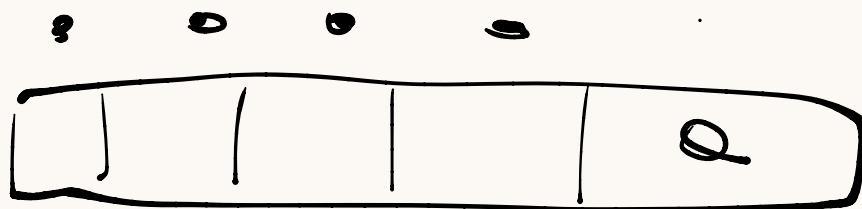
$\delta(L, e)$  A P.K

MARCAZ DOVS SAV OSA

— MSL ROMÈMOS DI  
"←" (sx), COPIANO  
SUL NA SMO LA GINPUT.

COPIANO TUTTA LA CONFIC.  
A NA SMO SINGOLI

(L)  $\Rightarrow$  (R, R<sub>RESET</sub>)



TM BIDIMENSIONALIS

matrice  $\{m \times n\}$   
infinita

$d_i: Q \times T \rightarrow Q \times T \times$

$\{\uparrow, \downarrow, \leftarrow, \rightarrow\} \quad (*)$

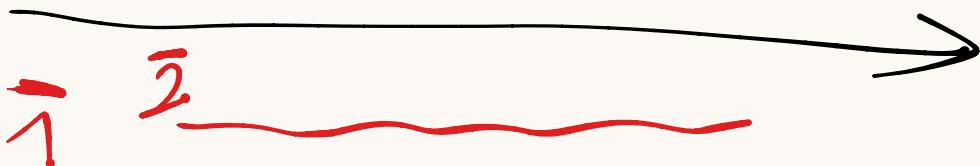
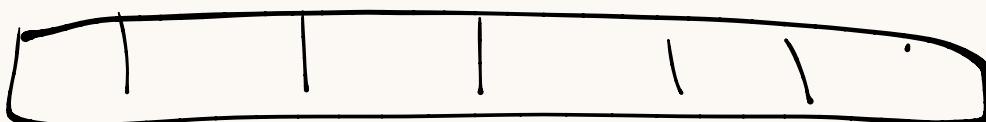
TM  $\leftrightarrow$  TM<sub>2D</sub>  
 $\{L, R\} \quad (*)$

APPROCCIO 1

2 NA SRR /

- 1 per RIGA

- 1 per COLONNA



-  $\delta(\gamma, e) = (s, b, \rightarrow)$

-  $\delta(\gamma, e) = (s, b, \leftarrow)$

$$\begin{aligned}- \delta(\pi, q) &= (s, b, \uparrow) \\&\quad = (s, b, \uparrow)\end{aligned}$$

## APPROCCIO 2

( $\Rightarrow$ ) ( $\uparrow$ )

- MARCO DUE ARRIVI

- TUTTA LA TRANS.

COPPIO I SIMBOLI

( $\Leftarrow$ ) STESO A

( $\uparrow$ ) SX

$\rightarrow$  MARCO

( $\downarrow$ ) CON UN SIMBOLO  
IL FAMO DI

QSI ALIZZ. LA TRANSIZIONE

- GPIO NUM 1. SIMBOLI

ERAVAMI ANS PLS CORDA

$\rightarrow$  ACCEPTA SUM GLI

STAR  $\rightarrow$  ACCEPTA

---

[K - PDA]  $\rightarrow$

PDA  $\vdash$  K STACK

0 - PDA  $\rightarrow$  DFA

1 - PDA  $\rightarrow$  NFA

---

a) 2 - PDA  $\rightarrow$  1 - PDA  
(2 STACK)

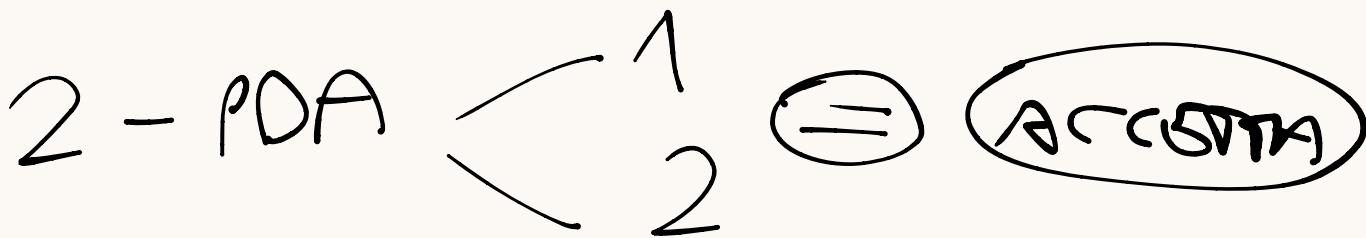
b) 3 - PDA  $\rightarrow$  2 - PDA

---

a) 2 - PDA  $\rightarrow$  PUSH

DE SIMBOU DI INPUT

- POP DAL PRIMO STACK
- PUSHI NEL SECONDO STACK
- COMPARA I SI PBL / 1 A 1



3 - PDA → 3 NASRI

2 - PDA → 2 NASRI

FUORI LB CONFIG. DI

2 NASRI

USANDO SIMBOLI PUR

POP e PUSH

↳ AUTOM 2 → 3°  
NASRI  
2 COMPUT. + LA SVA

# PORNZA SUI TM

ES. Dati due DFA,  
considera il problema  
 $\exists$  stringa accettata  
da entrambi

① FORMULA IL PROBL.

CONSL

② USA TM PER  
RAPPR.

ALGORITM =  $(A, B) \mid$   
 $A, B$  due DFA,  $\exists w \in L(A)$   
 $e \exists w \in L(B)$

$TM \rightarrow M = \text{INPUT}(A, B)$

$A, B$  sono  $\rightarrow C$  ( $TM$ )  
DFA

che prende in input

$A \in B$

→ segue su  $\{C\}$

→ se  $M$  accette, accetta

se  $M$  rifiuta, rifiuta

