Turing Machines

$$(Q, \Sigma, \Gamma, \delta, q_0, q_{accept}, q_{reject})$$

Q : set of states

Σ : input alphabet

Γ : tape alphabet $\quad \Sigma \subsetneq \Gamma \quad \sqcup \in \Gamma$

q_0 : start state

$q_{accept} \in Q$

$q_{reject} \in Q$

$$\delta : Q \times \Gamma \to Q \times \Gamma \times \{L, R\}$$

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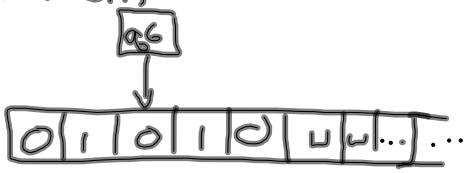
input: $w = w_1 w_2 w_3 \cdots w_n \in \Sigma^*$

configurations



$0 1 q_6 0 1 0$

$\delta(q_6, 0) = (q_7, \dot{0}, L)$

$0 q_7 1 \dot{0} 1 0$

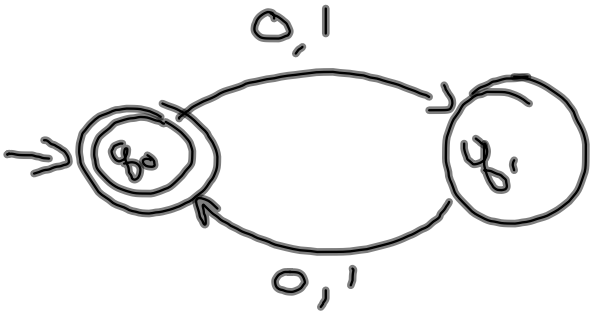
collection of strings that T.M. M accepts $L(M)$.

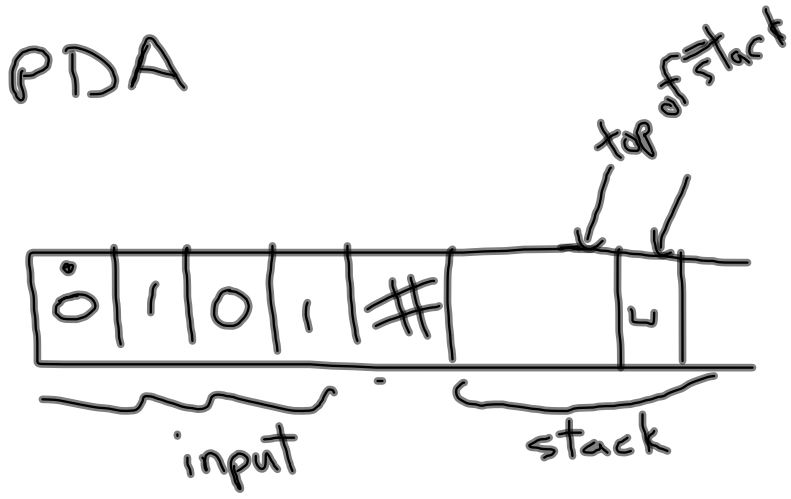
- $L(M)$ is the language recognized by M.
- a language is Turing recognizable if some TM recognizes it.

TM. that accept or reject all inputs are called deciders.

- a decider that recognizes a language is said to <u>decide</u> the language.

- A language is <u>decidable</u> if some TM decides it.


0, 1
0, 1


PDA
top of stack
0
1
0
1
#
␣
input
stack

$$L = \{ w \# w \mid w \in \{0,1\}^* \}$$