CPSC 421 Oct 21, 2024 Will Evans

DFA

$L = \{ w \in \{a,b\}^* \mid w \text{ ends with "a"} \}$

try to build DFA for L

(minimize # states)

DFA is $(Q, \Sigma, \delta, q_0, F)$

start state

Q: states $q_0\ q_1$

Σ: alphabet $\{a, b\}$

δ:

	a	b
q_0	q_1	q_0
q_1	q_1	q_0

F: accept $\{q_1\}$

Today Turing Machines

TM has a finite state control (like DFA)

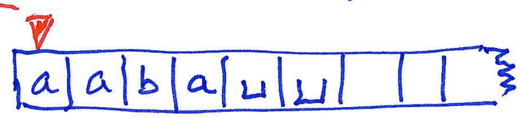
and ~~access~~ access to an infinite tape

that's divided into cells

read / write symbols to current tape cell

move the read/write head one cell to Left or Right

Start position of head



initial configuration has input string in the first n ~~ce~~ cells where n = input length

all other cells are blank "⊔"

TM is $(Q, \Sigma, \Gamma, \delta, q_0, q_{acc}, q_{rej})$

Q: states

Σ: input alphabet $\not\ni$ blank ⊔

Γ: tape alphabet, contains ⊔

q_{acc}, q_{rej}: and halt

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

For input x TM accepts x if TM enters q_{acc}

rejects x if TM enter q_{rej}

doesn't halt (loops forever) if TM never reaches q_{acc} or q_{rej}

$$q \xrightarrow{a \to \sqcup, L} r$$

TM M recognizes the language $\{x \in \Sigma^* \mid M \text{ accepts } x\}$

TM M decides the language if it recognize the language and always halts.