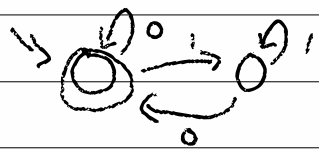
9-1) REX ⟶ NFA ⟶ DFA

ends in 0



$(0 \cup 1)^* \circ 0 \cup \varepsilon$

decompile : N-DFA ⟶ RE

start : N-dfa ⟶ (n+2)-gnfa

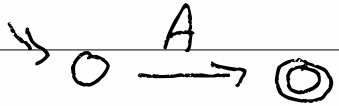
rip : : (n+1)-gnfa ⟶ n-gnfa

end : : 2-gnfa ⟶ re

decompile m = end $\circ$ rip^n $\circ$ start (m)

9-2/

end: 2-gnfa ⇒ re



⇒ A

generalized non-deterministic finite automata

GNFA = (Q , Σ , $q_s \in Q$, $q_e \in Q$,

$\Delta : (Q - q_e) \times (Q - q_s) \rightarrow RE(\Sigma)$)

end $(\{q_s, q_e\}, \Sigma, q_s, q_e, \{((q_s, q_e), r)\})$

= r

Q-3/ stunt : n-dfa ⇒ (n+2) - gnfa

in: $Q, \Sigma, q_0, \delta : Q \times \Sigma \to Q, F$

out: $Q', \Sigma, q_s, q_e, \Delta$

$Q' = Q \cup \{q_s, q_e\}$ $\quad \Delta(q_i, q_j) \to r$

$\Delta(q_s, q_0) = \varepsilon$

$\Delta(q_s, q_j)$ s.t $q_j \neq q_0 = \emptyset$

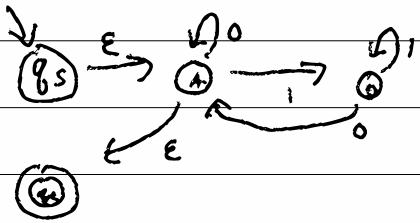
$\Delta(q_f \in F, q_e) = \varepsilon$

$\Delta(q_f \notin F, q_e) = \emptyset$

$\Delta(q_i, q_j) = \cup \{ c \mid \delta(q_i, c) \ni q_j \}$

9-4)

IN



start

Δ	A	B	qe
qs	ε	∅	∅
A	0	1	ε
B	0	1	∅

RIP: (n+1) - gnfa → n - gnfa

Q-5/ rip : (n+1)-gn fa → n-gn fa

$(Q, \Sigma, q_s, q_e, \Delta)$ $(Q', \Sigma, q_s, q_e, \Delta')$

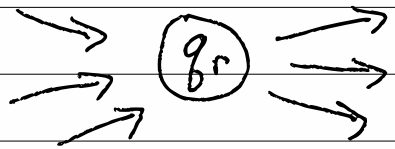
$Q = Q' \cup \{ q_r \}$

$\Delta : (Q - q_e) \times (Q - q_s) \to re$

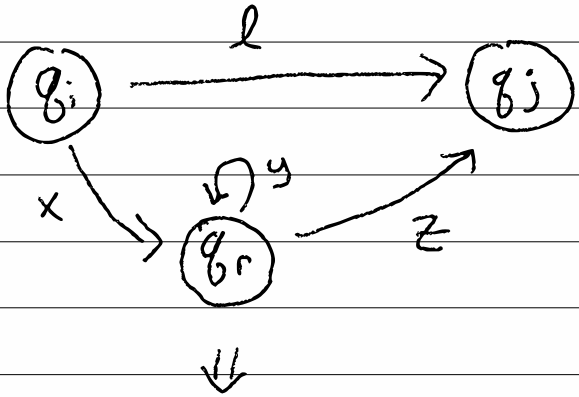
q_r ⇐

$\Delta' : (Q' - q_e) \times (Q' - q_s) \to re$

q_r ⇐



9-6)

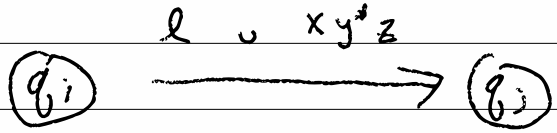


$l = \Delta(q_i, q_j)$

$x = \Delta(q_i, q_r)$

$y = \Delta(q_r, q_r)$

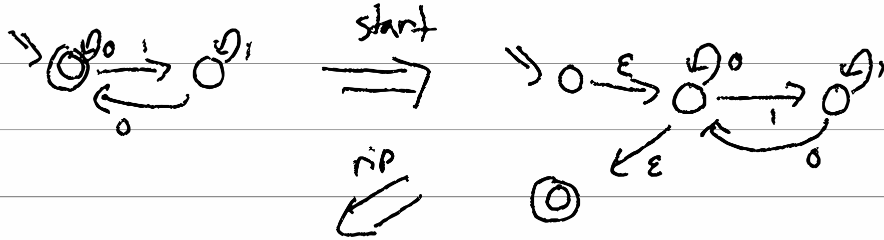
$z = \Delta(q_r, q_j)$

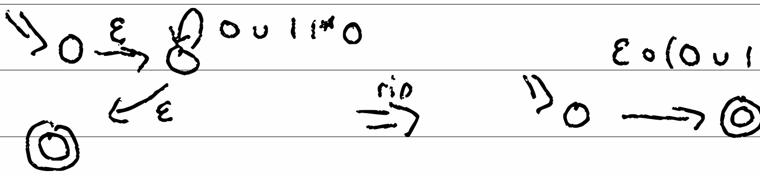


9-7/

$$\Delta'(q_i, q_j) =$$
$$\Delta(q_i, q_j)$$
$$\cup \left(\Delta(q_i, q_r) \right.$$
$$\circ \Delta(q_r, q_r)^*$$
$$\left. \circ \Delta(q_r, q_j) \right)$$

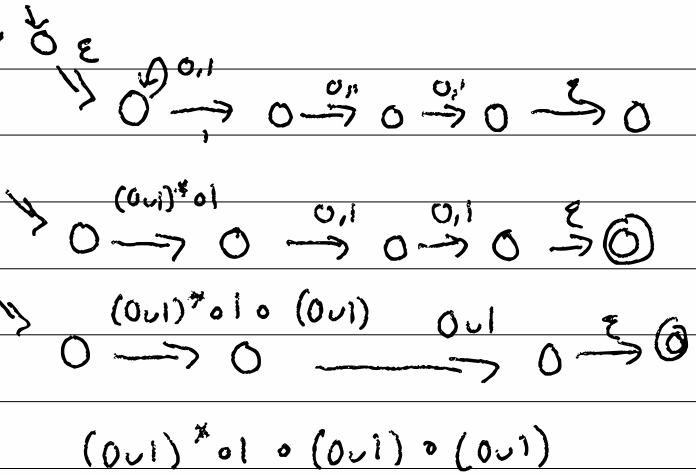
9-8/





$\varepsilon \circ (0 \cup 11^*0)^* \circ \varepsilon = (0 \cup 11^*0)^*$

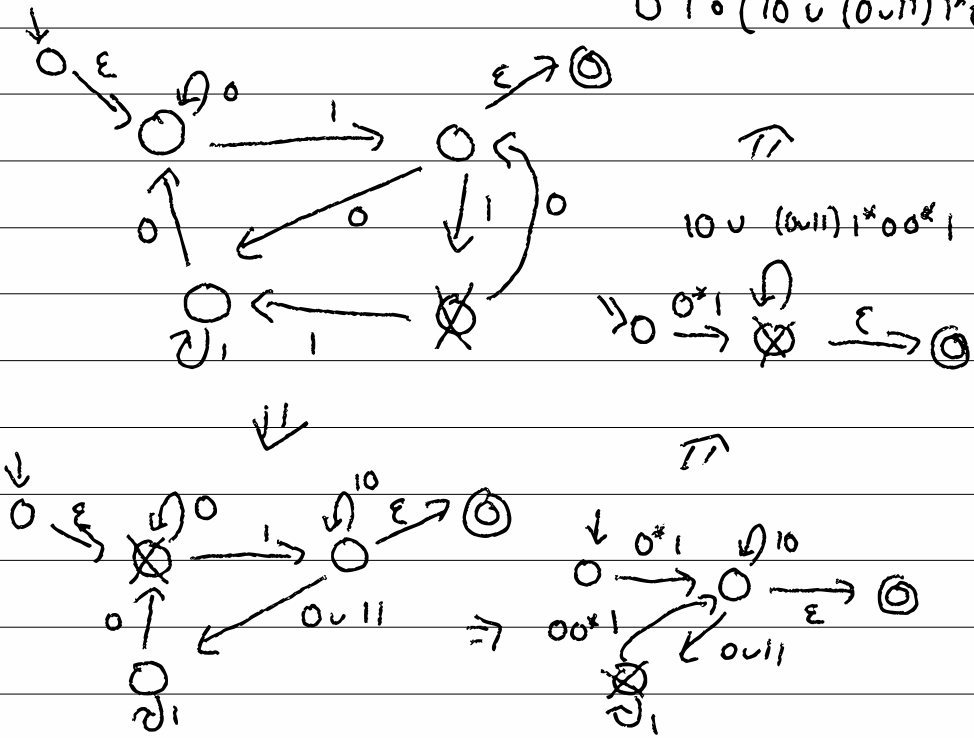
q-9/



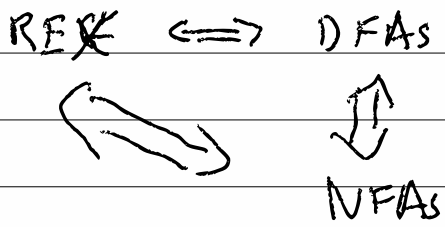
$(0 \cup 1)^* 01 \circ (0 \cup 1) \circ (0 \cup 1)$

9-10)

$0^*1 \circ (10 \cup (0 \cup 11)1^*00^*1)^*$



9-11



1 idea : regular language

3 representations : dfas, nfas, rex