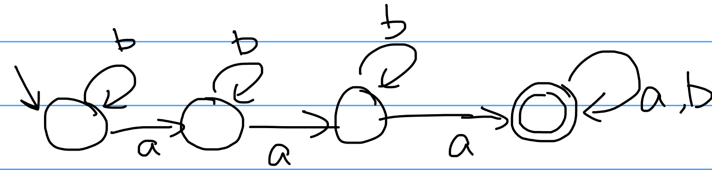
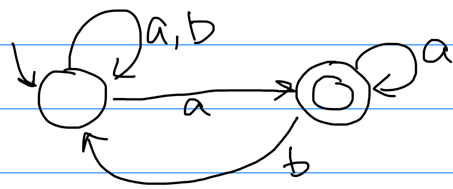
D.F.A.

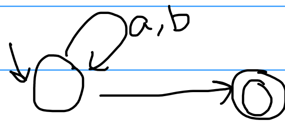


strings containing at least 3a's on {a, b}

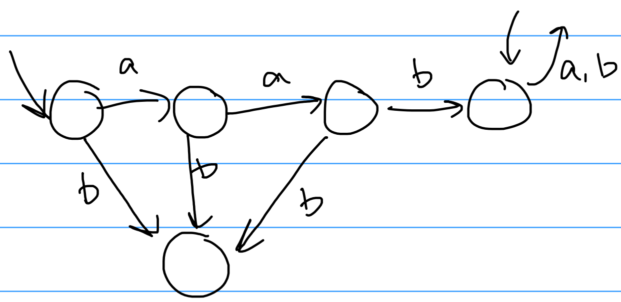
N.F.A.



Every string that ends with 'a'



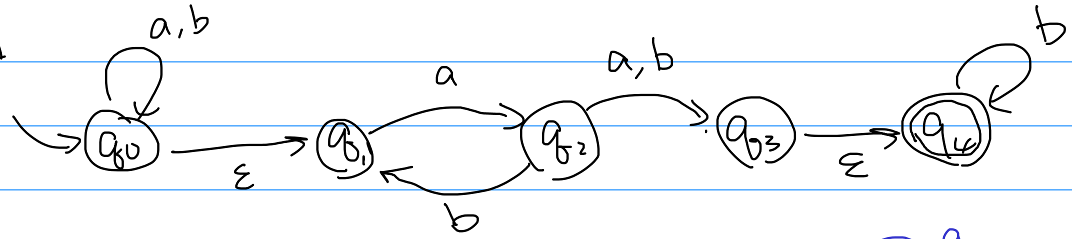
← Dead state : won't be okay!



$$\emptyset_D(Q, a) = \{ \varepsilon\text{-Change}(\bigcup_{P=\alpha} \phi(q, a)) \}$$

$M_n = M_0$

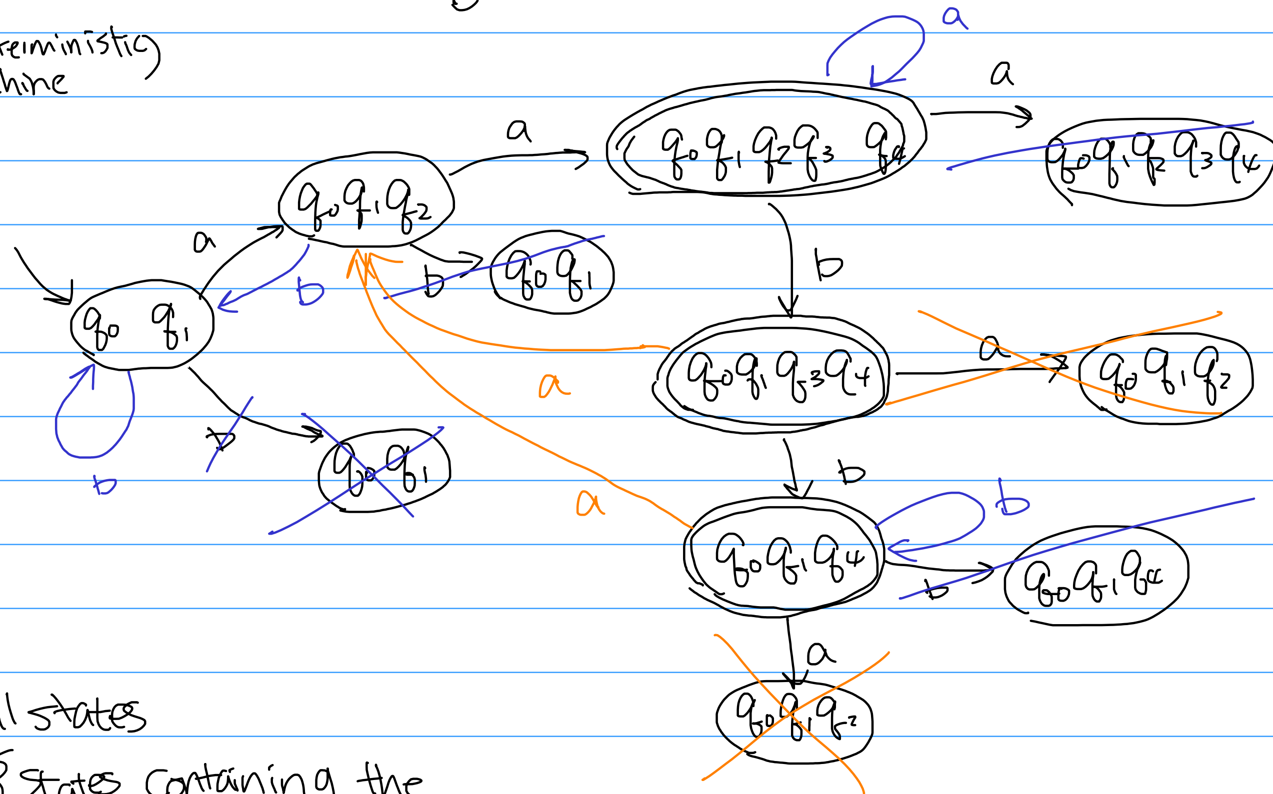
NFA



M_n

(non deterministic machine)

M_D

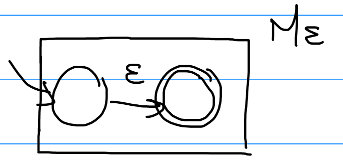


final states

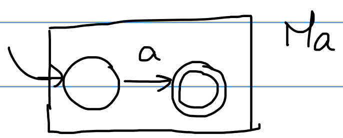
= {states containing the final state of M_n.

Regular Expression → NFA

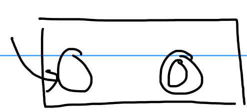
ε



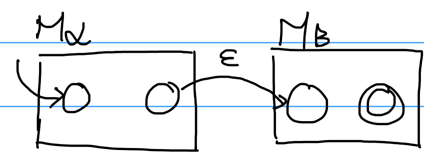
a



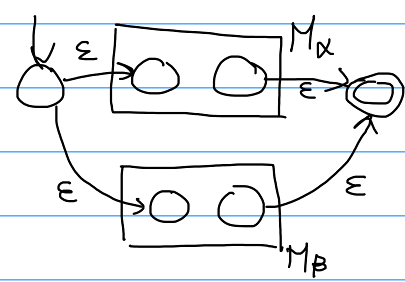
α



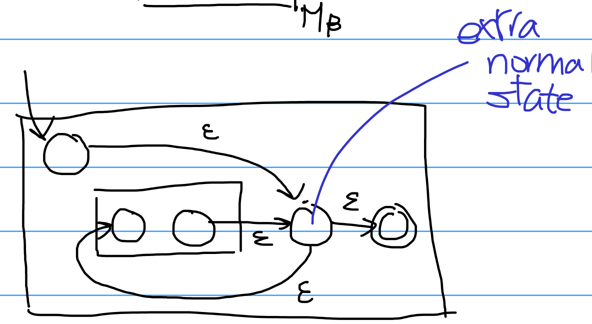
$\alpha\beta$



$\alpha|\beta$



α^*



DFA → reg. expr $\qquad\qquad \emptyset$ = transition

$\boxed{P_{ij}(Q)}$ ← want to find

$P_{ij}(Q)$ = Paths from q_i to q_j with all intermediate vertices in Q

P_0 ← initial state $\qquad P_f$ ← final state $\qquad (Q\,m)$ ← all states $\qquad$ Start with Q empty

$$P_{ij}(\emptyset) = \{ z \mid \phi(q_i, z) = q_j \}$$

↳ alternated OR together

Ex: $\qquad$ no input

$P_{00}(\emptyset) = \varepsilon \mid b \qquad P_{10}(\emptyset) = b$

$P_{01}(\emptyset) = a \qquad P_{11}(\emptyset) = \varepsilon$

$P_{02}(\emptyset) = \emptyset \qquad \vdots$

$P_{03}(\emptyset) = \emptyset \qquad P_{34}(\emptyset) = b$

$P_{04}(\emptyset) = \emptyset \qquad P_{44}(\emptyset) = b$

$P_{ij}(Q)$ when Q contain y (y is a stack) $\qquad P_{ij}(\underline{Q-y})$ ↳ 1 less state than Q

$$P_{ij}(Q) = \overbrace{P_{ij}(Q-y)}^{\text{path not containing } y} + \underbrace{P_{iy}(Q-y)P_{yy}(Q-y)^{*}P_{yj}(Q-y)}_{\text{path containing } y}$$

Ex: $Q = \{q_2, q_3\}$, $y = q_2$

$$P_{13}(Q) = \underbrace{P_{13}(\{q_3\})}_{\emptyset} \underbrace{\mid}_{\text{OR}} P_{12}(\{q_3\})\, P_{22}(\{q_3\})^{*} P_{23}(\{q_3\})$$