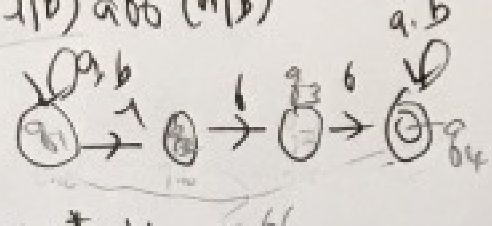
1) 4/11 (火) 3.4 Deterministic Automaton

Reg. rep.
- Def. of syntax – TP 3P
- Def. of semantic – TP 4P
- Unamb. R.E – TP 7P
- RE → FA TP 16P – proof, program

4×4×5

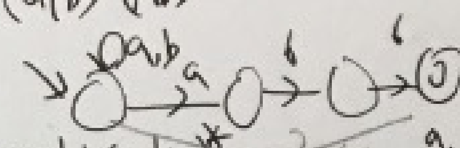
$(a|b)^* abb (a|b)^*$



substring abb

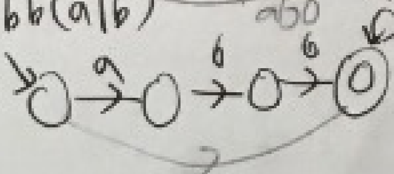
$E_{23} = ?$

$(a|b)^* abb$



postfix abb

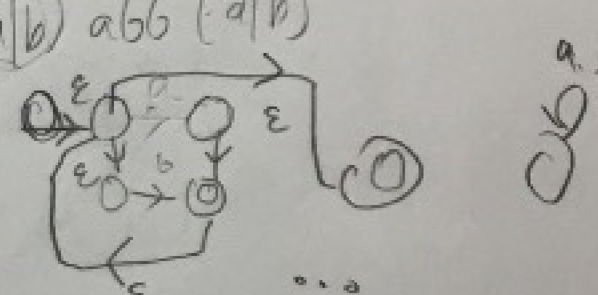
$abb(a|b)^*$



prefix abb

Subset construction
NFA → DFA

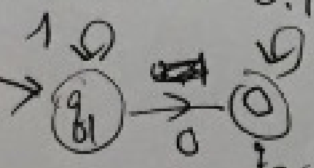
$(a|b)^* abb (a|b)^*$



(
피정의 fa
def: $\delta \; Q \times \Sigma^* \to 2^Q$
reduced lead state, inaccessible state > X
normal form $Q \times (\Sigma \cup \{\varepsilon\}) \to 2^Q$
ε-free $Q \times \Sigma \to 2^Q$
)

Thm 3.16 RE ⇒ FA (normal form)
Thm 3.17 FA ⇒ RE $O(|Q| \cdot |M| \cdot 4^{|Q|})$, $|Q|^3$

Ex 3.5 of CS322 TP p5



$$\left[\begin{array}{l} q_1 = 1q_1 + 0q_2 \\ q_2 = (0+1)q_2 + \varepsilon \end{array}\right.$$

$q_2 = (0+1)^* \cdot \varepsilon$

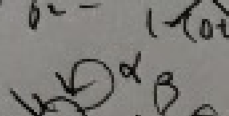
$q_1 = 1^* q_1 + 0(0+1)^*$

$q_1 = 1^* 0 (0+1)^*$

$q_1 = 1q_1 + 0q_2$

$q_2 = (0+1)q_2 + \varepsilon$

∴ $q_2 = \frac{1}{1-(0+1)} * \varepsilon$ (crossed out)



$q = \alpha q + \beta$

($q = \frac{1}{1-\alpha}\beta = (1+\alpha+\alpha^2+\cdots)\beta = \alpha^*\beta$) (crossed out)

$q = \alpha^* \beta$

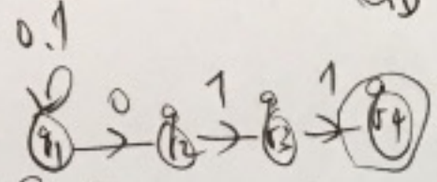
n-state → n-equation
연립방정식 풀기
유일 단 $A = \alpha A + \beta$ 이면 $A = \alpha^* \beta$.

2.4 DFA

NFA: $Q_N \times \Sigma \to 2^{Q_N} \to 2^{Q_N} \times \Sigma \to 2^{Q_N}$

DFA: $Q_D \times \Sigma \to Q_D$ ↕ $Q_D \times \Sigma \to Q_D$

$Q_D \leftrightarrow 2^{Q_N}$



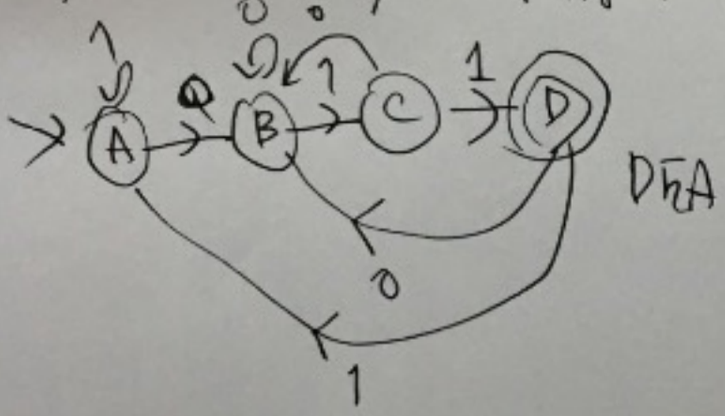
NFA

δ_N	0	1
$\{q_1\}$	$\{q_1, q_2\}$	$\{q_1\}$
$\{q_2\}$	ϕ	$\{q_3\}$
$\{q_3\}$	ϕ	$\{q_4\}$
$\{q_4\}$	ϕ	ϕ

	0	1
$\{q_1\}$	$\{q_1, q_2\}$	$\{q_1\}$
$\Rightarrow \{q_1, q_2\}$	$\{q_1, q_2\}$	$\{q_1, q_3\}$
$\{q_1, q_3\}$	$\{q_1, q_2\}$	$\{q_1, q_4\}$
$\{q_1, q_4\}$	$\{q_1, q_2\}$	$\{q_1\}$

renaming →

	0	1
A	B	A
B	B	C
C	B	D
D	B	A



DFA