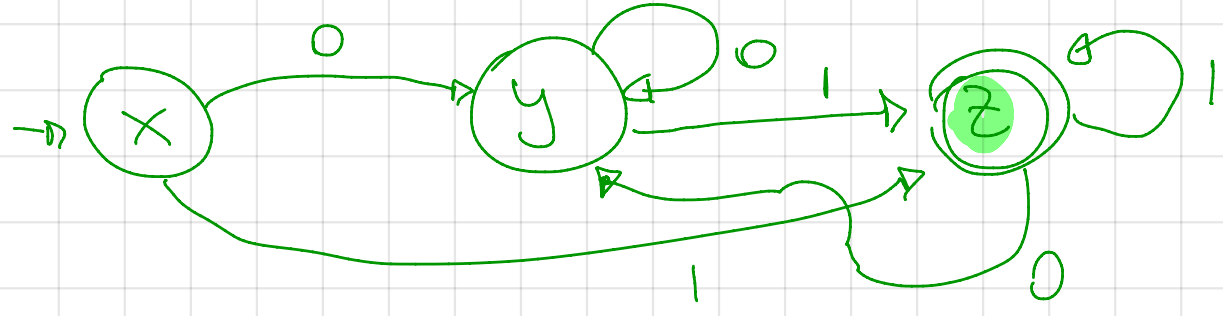


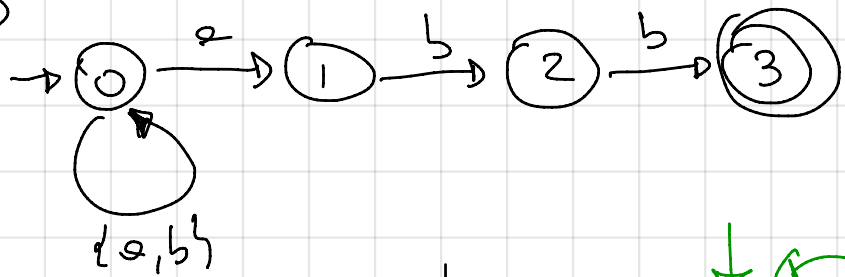
↳ DFA through SUBSET CONSTRUCTION

WORKLIST ← $\epsilon\text{-Closure}(\{A\}) = \{A, B, H, C, D\}$

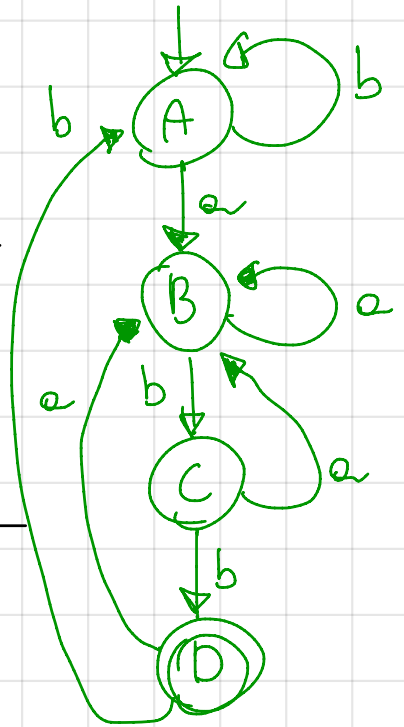
	0	1
$\{A, B, H, C, D, I\}$ X	$\epsilon\text{-cl}(\{F\}) = \{F, G, B, C, D, H, I\}$	$\epsilon\text{-cl}(\{E, J\}) = \{E, J, G, B, C, D, H, I\}$
$\{B, C, D, F, G, H, I\}$ Y	$\epsilon\text{-cl}(\{F\}) =$	$\epsilon\text{-cl}(\{E, J\}) =$
$\{B, C, D, E, G, H, I, J\}$ Z	$\epsilon\text{-cl}(\{F\}) =$	$\epsilon\text{-cl}(\{E, J\}) =$



$(a+b)^* abba$



	a	b
$\{0\} = A$	$\{0, 1\}$	$\{0\}$
$\{0, 1\} = B$	$\{0, 1\}$	$\{0, 2\}$
$\{0, 2\} = C$	$\{0, 1\}$	$\{0, 3\}$
$\{0, 3\} = D$	$\{0, 1\}$	$\{0\}$



FIRST PARTITION OF $\{A, B, C, D\}$

$$\pi_2 = \{ \{A, B, C\}, \{D\} \}$$

A \xrightarrow{a} B

B \xrightarrow{a} B

C \xrightarrow{a} B

A \xrightarrow{b} A

B \xrightarrow{b} C

C \xrightarrow{b} D

OK, cannot refine with symbol 'a'

→ C can be distinguished from

A and B, The group can be divided, to get a new partition

$$\pi_2 = \{ (AB), (C), (D) \}$$

Let's try to split (AB)

$$A \xrightarrow{a} B$$

$$B \xrightarrow{a} B$$

OK, no split with 'a'

$$A \xrightarrow{b} A$$

$$B \xrightarrow{b} C$$

Split

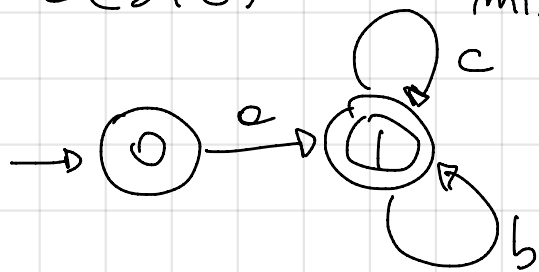
$$\pi_3 = \{ (A), (B), (C), (D) \}$$

This cannot be refined any more, so STOP

The automaton (DFA) is ALREADY a MINIMAL ONE!

$a(b|c)^*$

minimal DFA

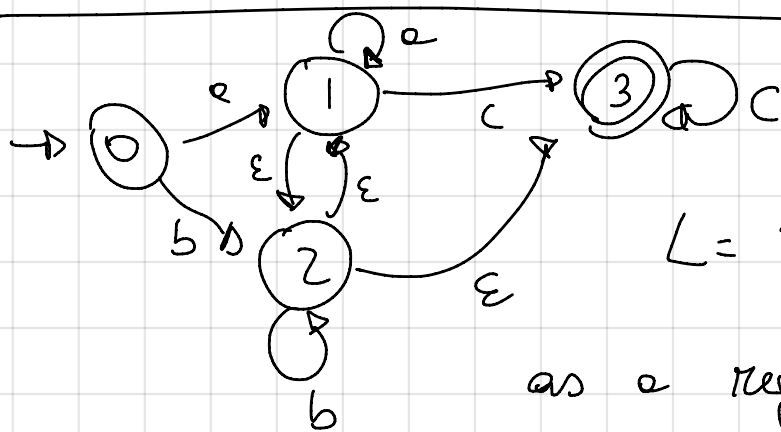


this is already deterministic

$\Pi_2 = \{ (0), (1) \}$

the partition cannot be refined

∴ the DFA is ALREADY MINIMAL.



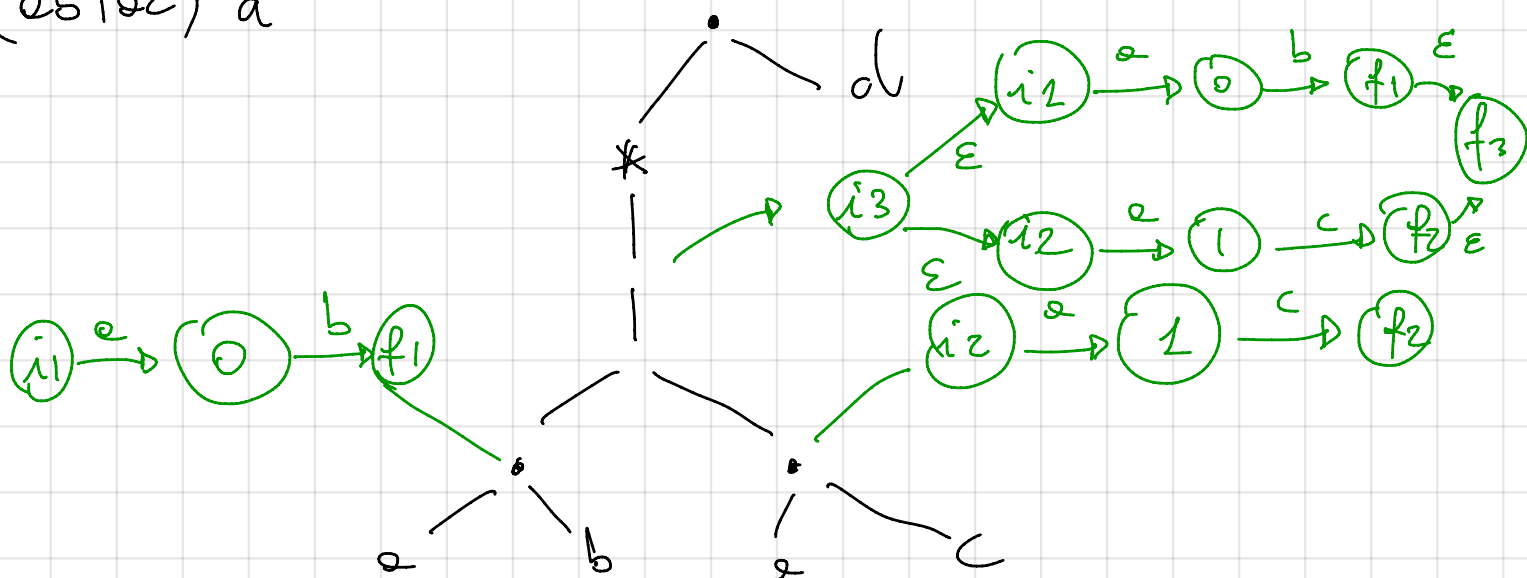
$\Sigma = \{a, b, c\}$

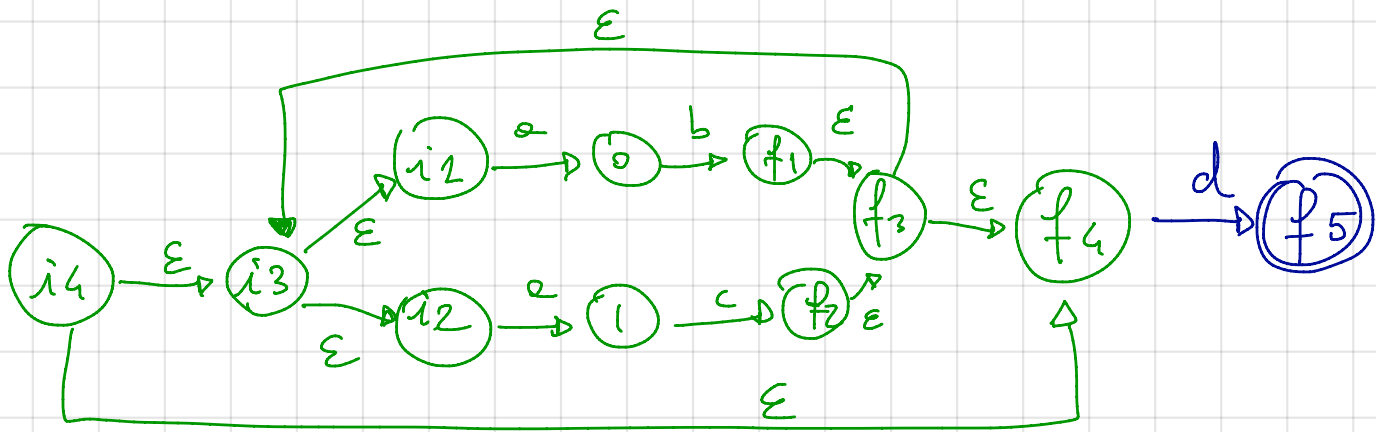
$L = \{ ac^m \mid a \in \{a, b\}^+, m \geq 0 \}$

as a regular expression:

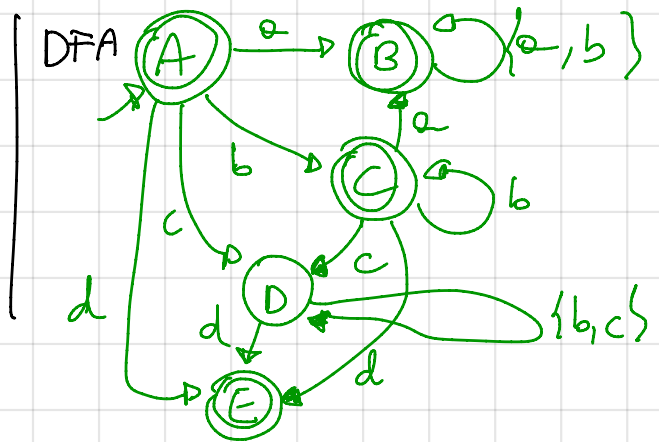
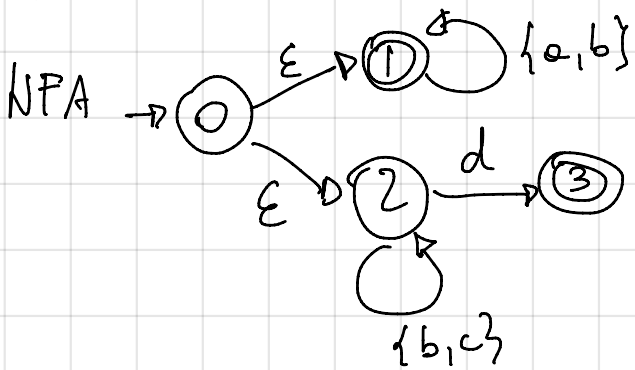
$(a|b)^+ c^*$

$(a|b|c)^*$



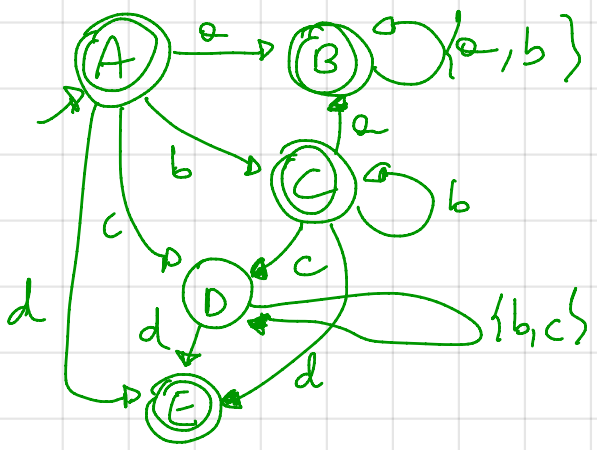


$$(a|b)^* \mid (b|c)^* d$$



$$\epsilon\text{-cl}(\{0\}) = \{0, 1, 2\}$$

	a	b	c	d
$\{0, 1, 2\} = A$	$\{1\}$	$\{1, 2\}$	$\{2\}$	$\{3\}$
$\{1\} = B$	$\{2\}$	$\{1\}$	/	/
$\{1, 2\} = C$	$\{1\}$	$\{1, 2\}$	$\{2\}$	$\{3\}$
$\{2\} = D$	/	$\{2\}$	$\{2\}$	$\{3\}$
$\{3\} = E$	/	/	/	/



Minimization

$$\Pi_1 = \{ (D), (A B C E) \}$$

$A \xrightarrow{c} D$
 $B \not\xrightarrow{c} D$
 $C \xrightarrow{c} D$
 $E \not\xrightarrow{c} D$

Split

$$\Pi_2 = \{ (D), (A C), (B E) \}$$

$B \xrightarrow{a} B$
 $E \not\xrightarrow{a} B$

Split

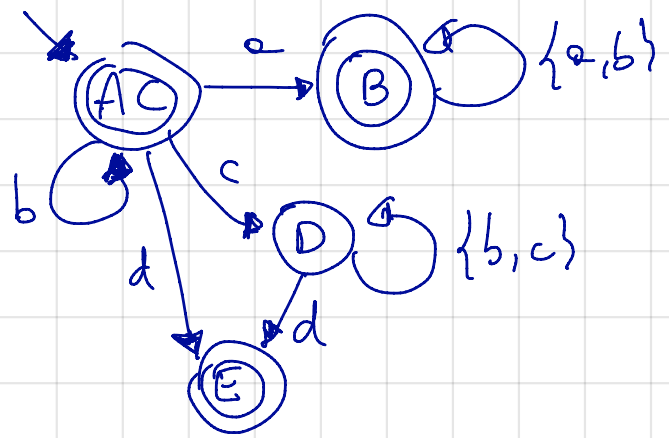
$$\Pi_3 = \{ (D), (A C), (B), (E) \}$$

$A \xrightarrow{a} B$ $A \xrightarrow{b} C$
 $C \xrightarrow{a} B$ $C \xrightarrow{b} C$

$A \xrightarrow{d} E$ $C \xrightarrow{d} E$

Cannot be splitted

The final partition is Π_3



Minimal automaton for the language.