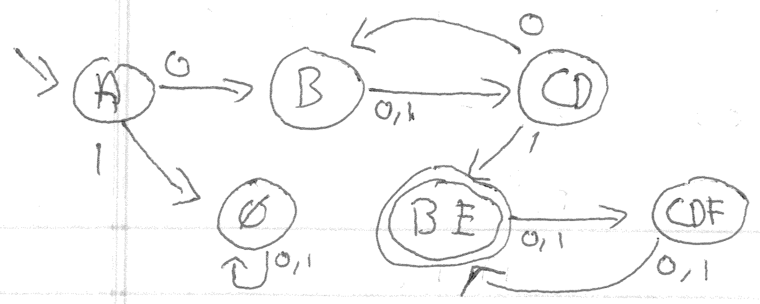
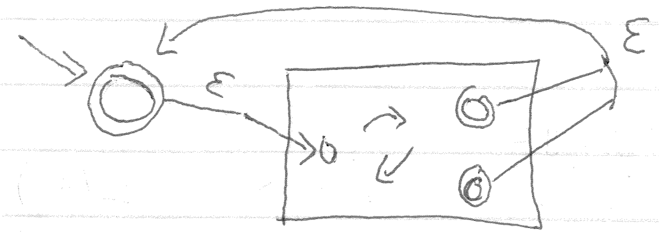
5-4



0

Star : $A^* = \{ \cancel{\quad} x_1 \dots x_n \mid x_i \in A \}$ $n \in [0, \dots)$

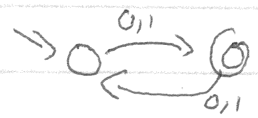
$\varepsilon \in A^*$ $A^* = \varepsilon \cup A \circ A^*$



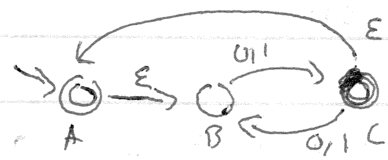
A

$2n+1$
$2m+1$ $>$ $2(n+m+1$

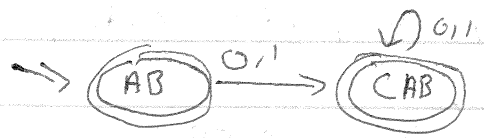
A = odd



A^*

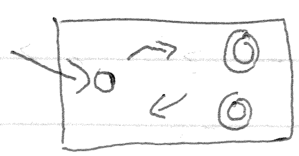


$C(A^*)$

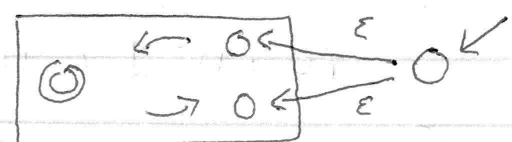


Reversal $A^R = \{ x \mid x^R \in A \}$

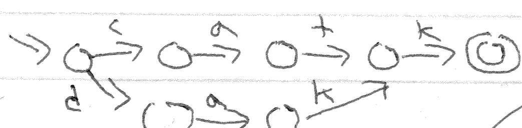
$A = \{cat\}$ $A^R = \{tac\}$



A

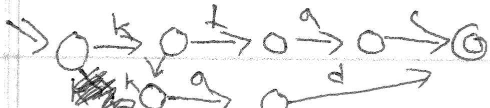


A^R



$\{catk, dakk\}$

$\{kkad, ktac\}$



2/ Regular Operations : $\cup, \circ, *, R, \cap, \sim$

Regular Expression re over Σ =

$\emptyset$ — r_1^R

ε — $r_1 \cap r_2$

$a \in \Sigma$ — $\sim r_1$

$r_1 \cup r_2$ // $(r_1 | r_2)$ — $\cdot$ — $L(\cdot) = \Sigma$

$r_1 \circ r_2$ // $r_1 r_2$

r_1^*

L : regexp $\Rightarrow$ language

$L(\emptyset) = \emptyset \qquad L(\varepsilon) = \{\varepsilon\} \qquad L(a) = \{a\}$

$L(r_1 \cup r_2) = L(r_1) \cup L(r_2) \qquad L(r_1 \circ r_2) = L(r_1) \circ L(r_2)$

and so on ...

$L(cat) = \{cat\} = L(c \circ a \circ t)$

$L(c(a \cup d)^* r) = \{cr, car, cdr, cadr, cdar, caaaadr, \ldots\}$

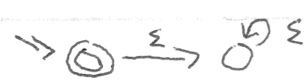
REX = REG? (DFA = NFA)

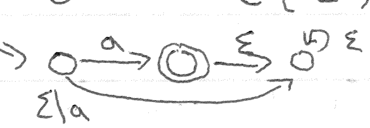
① $\forall R \in REX.\ \exists D \in DFA.\ L(R) = L(D)$ ← compiler from regexp to DFAs — C

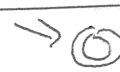
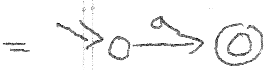
② $\forall D \in DFA.\ \exists R \in REX.\ L(D) = L(R)$ ← dissassembler — D

D([3 from end]) = ______ C( ) = 1 from end

$(0 \cup 1)^* 1 (0 \cup 1)(0 \cup 1) = \Sigma^* 1 \Sigma \Sigma = .^* 1 . .$

C($\emptyset$) =  C(ε) = 

C(a) = 

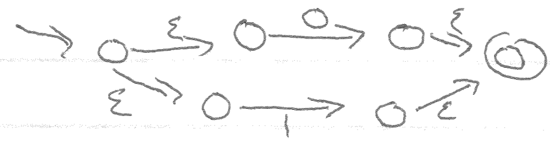
C($\emptyset$) =  C(ε) =  C(a) = 

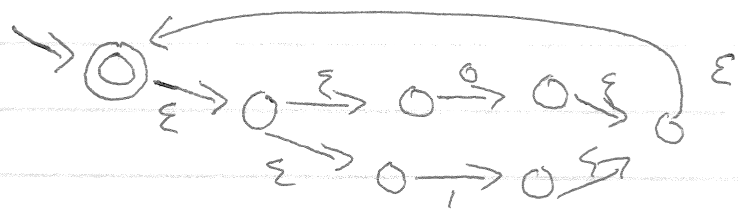
6-3/ $C(\Sigma^* 1 \Sigma\Sigma) = C(\Sigma^* \circ (1 \circ (\Sigma \circ \Sigma))) =$

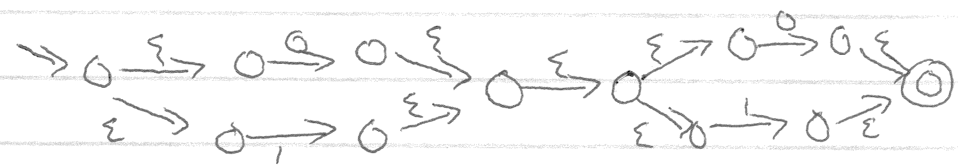
$C(\Sigma) = C(\cancel{\emptyset}\ 0 \cup 1)$

$C(0) = \rightarrow \circ \xrightarrow{0} \circledcirc$

$C(1) = \rightarrow \circ \xrightarrow{1} \circledcirc$

$C(\Sigma) =$  $= \rightarrow \circ \xrightarrow{0,1} \circledcirc$

$C(\Sigma^*) =$ 

$C(\Sigma \circ \Sigma) =$ 

$\sim \rightarrow \circ \xrightarrow{0,1} \circ \xrightarrow{0,1} \circledcirc$

$\varepsilon \circ r = r = r \circ \varepsilon$ $(\circ = \times,\ \varepsilon = 1,\ \emptyset = 0)$

$\emptyset \circ r = \emptyset = r \circ \emptyset$

$\emptyset \cup r = r = r \cup \emptyset$ $(\cup = +,\ \emptyset = 0)$

$r_1 \cup r_2 = r_2 \cup r_1$

$\varepsilon^* = \varepsilon$ (* is like exponentiation)

$\emptyset^* = \varepsilon$

$r_1 \circ (r_2 \cup r_3) = r_1 \circ r_2 \cup r_1 \circ r_3$ ($\cup$ and $\circ$ distribute)

$\cancel{(r_2 \cup r_3)^* = r_2^* \cup r_3^*}$

$r_1^{RR} = r_1$ $\boxed{\sim / \cup / \cap \text{ obey de-morgan/etc rules}}$