CSC 220

10/1/2020

$$L_1 = \{ a^n \mid n \in \mathbb{N} \} = \{ \lambda, a, aa, aaa, \dots \}$$

$n=0$ $n=1$ $n=2$ $n=3, \dots$

$$L_2 = \{ ab^n \mid n \in \mathbb{N} \} = \{ a, ab, abb, abbb, \dots \}$$

$$L_3 = \{ (ab)^n \mid n \in \mathbb{N} \} = \{ \lambda, ab, abab, ababab, \dots \}$$

if L, M are Languages:

$$L \cdot M = \{ st \mid s \in L, t \in M \}$$

if $L = \{a, b\}$ $M = \{c\}$

$LM = \{ac, bc\}$

if $L = \{ab, cd\}$ $M = \{a, bc, abc\}$

$LM = \{aba, abbc, ababc, cda, cdbc, cdabc\}$

$L \cdot \{\lambda\} = L = \{\lambda\} \cdot L$

$L \cdot \lambda$ *wrong not defined

$L \cdot \phi = \phi \cdot L = \phi$

$a \cdot \lambda = \lambda \cdot a = a$

$\{\lambda\} \cdot a$ * wrong not defined

$\{\lambda\} \cdot \{a\} = \{\lambda a\} = \{a\}$

$L^n = \{ s_1 s_2 \cdots s_n \mid s_k \in L, k \in \mathbb{N} \}$

$L^\circ = \{\lambda\}$ always

if $L = \{a, bb\}$

$L^0 = \{\lambda\}$

$L^1 = L = \{a, bb\}$

$L^2 = L^1 L^1 = \{a, bb\} \cdot \{a, bb\}$

$= \{aa, abb, bba, bbbb\}$

$L^3 = L \cdot L \cdot L = \{a, bb\} \cdot \{a, bb\} \cdot \{a, bb\}$

$= \{aa, abb, bba, bbbb\} \cdot \{a, bb\}$

$= \{aaa, aabb, abba, abbbb, bbaa, \ldots\}$

. Closure : If L is a language then the closure of L is L^*.

$L^* = L^0 \cup L^1 \cup L^2 \cdots \cup L^n \cdots$

. Let $A = \{a, b, c\}$

. all strings over A with length $0 \longrightarrow \lambda$

$1 \longrightarrow a, b, c$

$2 \longrightarrow aa, ab, ac$
ba, bb, bc
ca, cb, cc

. If A contains n elements there are n^k strings of length k in A^*.

Guess L ?

$\{a, b\}$. $L = \{a, b, aba, bba\}$

$L = \{\lambda, ba\}$

$\{\lambda, a, ab\}$. $L = \{b, ba, ab, aba, abb, abbab\}$

$L = \{b, ba\}$

if $A = \{0, 1\}$

$A^0 = \{\lambda\}$ $\quad A^2 = \{0,1\} \cdot \{0,1\} = \{00, 01, 10, 11\}$

$A^3 = \{000, 001, 010, 011, 100, 101, 110, 111\}$
$\quad\quad\quad 1 \quad 2 \quad 3 \quad 4 \quad 5 \quad 6 \quad 7 \quad 8$

. A is a language, ϕ is a language, A^* is a language, $\{\lambda\}$ is also a language.