# **Class Note 1**

E.g.s of Regular Language

L1 = {0, 00, 000, 0000, …..}

L2 = {01, 011, 0111, 01111, …..}

E.g .of Context Free Language: L1, L2, … (all regular languages)

A language that is Context Free but not Regular:

L3 = {dad, madam, mom, aba, cbc, bb, aa, …}

An automaton is a theoretical device to recognize strings in a language.

Automaton: singular, Automata: plural

|ε| = 0

|{ε}| = 1

# **Class Note 2**

ε (he)2 = (he)2 = hehe

( (he) (sit) )2 = hesit . hesit =hesithesit

L = {10, 1}, M = {000, 010}

so LM = {10000, 10010, 1000, 1010}

and ML = {00010, 0001, 01010, 0101}

LM ≠ ML

, 01, 110, 11001,0101}

L = {ε, 01}

L2 = LL = {ε, 01} {ε, 01}

= {ε, 01, 0101}

= {(01)0, (01)1, (01)2}

L3 = LL2 = {ε, 01}{ε, 01, 0101}

= {ε, 01, 0101, 010101}

= {(01)0, (01)1, (01)2, (01)3}

…

Ln = {(01)k: 0 ≤ k ≤ n} //set builder notation

= {ε, 01, 0101, 010101, ….} //roaster method

L\* = {(01)k: 0 ≤ k } //set builder notation

Let Σ = {0,1}

Σ\* = Σ0 U Σ1 U Σ2 U …

= { ε } U {0,1} U {00,01,10,11}U …

# **Class Note 3**

Σ = {a,b}

Σ\* = { ε, a, b, aa, ab, ba, bb, aaa, ….}

Leven = { ε, aa, ab, ba, bb, aaaa, aaab, …}

La\*b\* = { ε, a, b, aa, ab, bb, aaa, aab, abb, bbb, aaaa, aaab, aabb, abbb, bbbb, ….}

Lanbn = {ε,ab, aabb, aaabbb, aaaabbbb,…}

Lprime = {aa, aab, aba, baa, abba, ….

aaa, abaa, baaa, aaab, abbaa, …

aaaaa, aaaaab, …}

{0,1}3 = {000, 001, 010, 011,

100, 101, 110, 111}

Alt:

{0,1}2 = {0,1}{0,1} = {00,01,10,11}

{0,1}3 = {0,1}{00,01,10,11}

= {000, 001, 010, 011,

100, 101, 110, 111}

Le0 = {001, 010, 100, 111}

*0 ≤ n < m ≤ 2*

* n = 0, m = 1,2
* n = 1, m = 2

Lmn = *{0110, 0210, 0211} = {0, 00, 001}*

Lnm = *{0112, 0113, 0213}*

*= {011, 0111, 00111}*

L101 = {w in {0,1}\* : w ends with 101}

= {101, 0101, 1101, 00101, 01101, 10101, 11101, 000101, …}

= {0,1}\*{101}

Regular Expression (RE) representation of this language = (0/1)\*101

Ls101 = {w in {0,1}\* : w contains 101 as a substring}

= {101, 0101, 1101, 00101, 01101, …

1010, 1011, 10100, 10101, …

01010, 01011, 11010, 11011, ….}

RE representation of this language =

(0/1)\*101(0/1)\*

L2mn = *{0, 00, 001}{0, 00, 001}*

= {00,000,0001,

0000,00001,

0010, 00100, 001001}