
بالعلم نرتقي

Example

2nd Semester 2020-2021
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Lec #10

Examples

$L = \{\lambda\}$

G:

$S \rightarrow \lambda$

Σ = {a, b}

L ={a, b}

G:

$S \rightarrow a \mid b$

Σ = {a, b}

L ={λ, a, b}

G:

$S \rightarrow a$

$S \rightarrow b$

$S \rightarrow \lambda$

G:

$S \rightarrow a \mid b \mid \lambda$

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

R R

$L = \{aa, ab, ba, bb\} \equiv (a+b)(a+b)$

G:

$S \rightarrow aa \mid ab \mid ba \mid bb$

OR

G:

$S \rightarrow RR$

$R \rightarrow a \mid b$

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

$L = \{a^n \in \{a, b\}^* : n \geq 0\}$

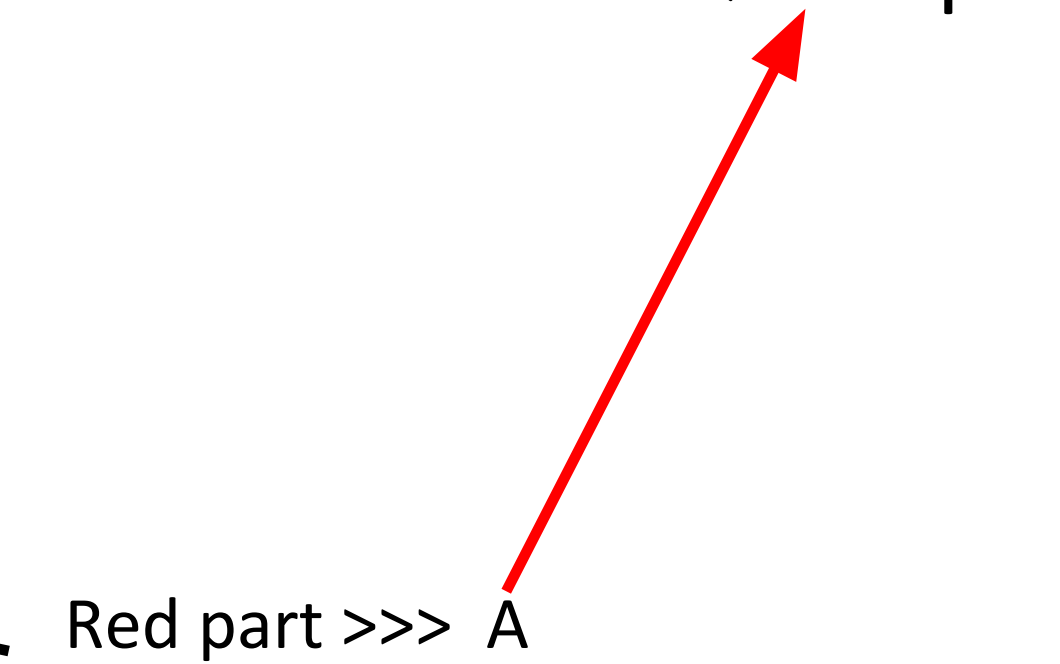
$L = \{\lambda , a, aa, aaa, \ldots\}$

$S \rightarrow aS \mid \lambda$

G:

$S \rightarrow Sa \mid \lambda$

n=0	λ	
n=1	λa	a
n=2	aa	
n=3	aaa	
n=4	aaaa	



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

$L = \{a^n \in \{a, b\}^* : n \geq 1\}$

$L = \{a, aa, aaa, \ldots\}$

$S \rightarrow aS|a$

G:

$S \rightarrow Sa|a$

n=1	a
n=2	aa
n=3	aaa
n=4	aaaa

∑ = {a, b}

L ={w ∈{a, b}*: w contains any number of a’s and b’s}

L = {λ , a, b, aa, ab, ba, bb, aaa, …}

(a+b)*

G:

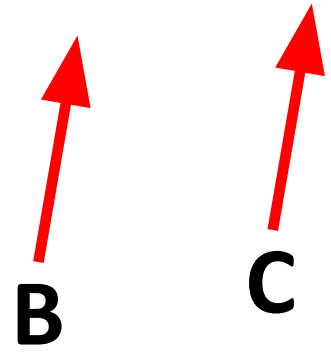
S → aS | bS | λ

$\sum = \{a, b\}$

L ={w $\in${a, b}*: |w| is at least 2 }

L = {aa, ab, ba, bb, aaa, …}

(a+b) (a+b)(a+b)*



G:

S → BBC

B →a | b

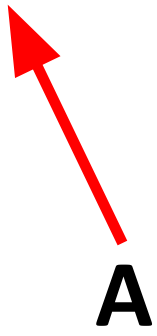
C → aC | bC | λ

∑ = {a, b}

L ={w ∈{a, b}*: |w| is at most 2 }

L = {λ, a, b, aa, ab, ba, bb}

(λ+a+b) (λ+a+b)



A

G:

S → AA

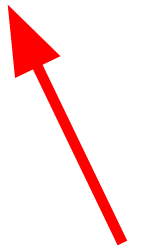
A → a | b | λ

∑ = {a, b}

L ={w ∈{a, b}*: w starts with a and ends with b }

L = {ab, aab, abb, aaab, …}

a (a+b)*b



A

G:

S → aAb

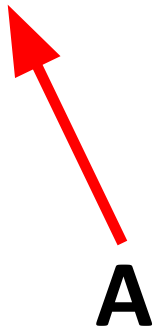
A → aA | bA | λ

∑ = {a, b}

L ={w ∈{a, b}*: w starts and ends with different symbols }

L = {ab, ba, aab, baa, aaab, …}

a (a+b)*b + b (a+b)*a



A

G:

S → aAb | bAa

A → aA | bA | λ

∑ = {a, b}

L ={w ∈{a, b}*: |w| is even}

L = {λ, ab, aa, ab, bb, aaaa, ...}

((a+b)(a+b))*

B

G:

S → AS | λ

A → BB

B → a |b

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

$L = \{a^n b^n \in \{a, b\}^* : n \geq 0\}$

$L = \{\lambda, ab, aabb, aaabbb, \ldots\}$

G:

$S \rightarrow aSb \mid \lambda$

n=0	λ
n=1	ab
n=2	aabb
n=3	aaabbb
n=4	aaaabbbb

S

∑ = {a, b}

L = $\{ww^R : w \in \{a, b\}^*\}$

W = aaba w^R = abaa ww^R =aabaabaa

G:

S → aSa | bSb | λ

∑ = {a, b}

$L = \{a^n b^m \in \{a, b\}^* : n, m \geq 1\}$

ab, abb, aaaabb

L = L1 L2

$L1 = \{a^n \in \{a, b\}^* : n \geq 1\}$

$L2 = \{b^m \in \{a, b\}^* : m \geq 1\}$

G1:

$A \rightarrow aA \mid a$

G2:

$B \rightarrow bB \mid b$

G:

$S \rightarrow AB$

$A \rightarrow aA \mid a$

$B \rightarrow bB \mid b$

∑ = {a, b}

$L = \{a^n b^n c^m \in \{a, b\}^* : n, m \geq 1\}$

abc, abcc, aabbcccc

L = L1 L2

$L1 = \{a^n b^n \in \{a, b\}^* : n \geq 1\}$

$L2 = \{c^m \in \{a, b\}^* : m \geq 1\}$

G1:

$A \rightarrow aAb \mid ab$

G2:

$B \rightarrow cB \mid c$

G:

$S \rightarrow AB$

$A \rightarrow aAb \mid ab$

$B \rightarrow cB \mid c$

$\sum = \{a, b\}$

$L = \{a^n b^m c^n \in \{a, b\}^* : n, m \geq 1\}$

abc, abbc, aabbbbcc

G:

$S \rightarrow aSc \mid aAc$

$A \rightarrow bA \mid b$

n=1	abc
n=2	aabcc
n=3	aaabbccc
n=4	aaaabbbcccc
n=5	aaaaabccccc

∑ = {a, b}

$L = \{a^n b^n c^m d^m \in \{a, b\}^* : n, m \geq 1\}$

abcd, aabbcd, aabbccdd

L = L1 L2

$L1 = \{a^n b^n \in \{a, b\}^* : n \geq 1\}$

$L2 = \{c^m d^m \in \{a, b\}^* : m \geq 1\}$

G1:

$A \rightarrow aAb \mid ab$

G2:

$B \rightarrow cBd \mid cd$

G:

$S \rightarrow AB$

$A \rightarrow aAb \mid ab$

$B \rightarrow cBd \mid cd$

∑ = {a, b}

$L = \{a^n b^{2n} \in \{a, b\}^* : n \geq 1\}$

abb, aabbbb, …

G:

S → aSbb | abb

∑ = {a, b}

$L = \{a^n b^m c^m d^n \in \{a, b\}^* : n, m \geq 1\}$

abc, abbc, aabbbbcc

G:

S → aSd | aAd

A → bAc | bc