GRAMMARS

1. Given the grammar $G = (N,\ \Sigma,\ P,\ S)$

$N = \{S, C\}$

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

$P:\ S \ \to ab \mid aCSb$

$\quad C \ \to S \mid bSb$

$\quad CS \ \to b$,

prove that $w \ = \ ab(ab^2)^2 \ \in L(G)$.

Sol.:

$a^2b^2 = aabb \ \neq \ (ab)^2 = \ abab$

//Oana Nourescu

$$S \underset{(2)}{\Rightarrow} aCSb \underset{(4)}{\Rightarrow} abSbSb \overset{2}{\underset{(1)}{\Rightarrow}} ababbabb = w$$

$$\Rightarrow S \overset{4}{\Rightarrow} w \Rightarrow w \in L(G)$$

2. Given the grammar $G = (N,\ \Sigma,\ P,\ S)$

$N = \{S\}$

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

$P:\ S \ \to a^2S \mid bc$,

find $L(G)$.

// Paun Tudor

L = { $a^{2k}bc$, $where\ k \ \in N$ **}**

L = L(G) ?

1. L ⊆ L(G)
2. L(G) ⊆ L

//Ariana Hategan

1. $\forall \quad k \in N, a^{2k}bc \in L(G)$

   $P(k): a^{2k}bc \in L(G)$ **and prove that P(k) true for** $\forall$ $k \in N$

   a) Verification step

   $P(0): a^0bc \in L(G) \Leftrightarrow bc \in L(G)$

   S => bc

   So, P(0) is true

b) $P(n)\ true \rightarrow P(n+1)\ true,\ n \in N$

$P(n)\ true \Rightarrow a^{2n}bc \in L(G) \Rightarrow S \overset{*}{\Rightarrow} a^{2n}bc\ (induction\ hypothesis)$

$S \underset{(1)}{\Rightarrow} a^2S \underset{(ind\ hypo)}{\overset{*}{\Rightarrow}} a^2a^{2n}bc = a^{2(n+1)}bc$

=> P(n+1) true

a) + b) => (1)

//Razvan Neta

$S \Rightarrow bc$

$\Rightarrow a^2S \Rightarrow a^2bc$

$\Rightarrow a^4S \Rightarrow a^4bc$

$\Rightarrow a^6S \Rightarrow$ …

$=>$ **...**

It may be noticed that starting from S and using **all productions** in **all possible combinations**, we only get, as sequences of terminals, sequences of the shape $a^{2n}bc,\ n \in N$

It follows that the grammar generates nothing else.

3. Find a grammar that generates $L = \{0^n 1^n 2^m \mid n, m \in \mathbb{N}^*\}$

Petcu Dragos

A -> 01 | 0A1
B -> 2 | 2B
S -> AB

Oana Nourescu
S -> AB
A -> 01 | 0A1
B -> 2 | B2

Diaconu Bogdan
S->0A1B
A->0A1|ε
B->2|2B

Moldovanu Dragos
A->01|0A1
B->2|2B
S->AB

//Moldovan Vasilica
S -> 0S1C | 012
C -> 2C |epsilon

Pascotescu Iuliana
S -> 0K1 | 01 | T | ST
T -> 2T | 2
K -> 0K1 | 01

//Onita Andrei
P: S= A B
A= 0 S 1 | 01
B= S 2 | 2

G=({S,A,B}, {0,1,2}, P, S)
P:
S -> AB
A -> 01 | 0A1
B -> 2 | B2

$? L(G) = L$

1. $? \ L \subseteq L(G)$

$? \ \forall n, m \in N^*, \ 0^n 1^n 2^m \in L(G)$

Let $n, m \in N^*$ **fixed**

$$S \underset{(1)}{\Rightarrow} AB \overset{n}{\underset{(i)}{\Rightarrow}} 0^n 1^n B \overset{m}{\underset{(ii)}{\Rightarrow}} 0^n 1^n 2^m$$

=> $S \overset{n+m+1}{\Rightarrow} 0^n 1^n 2^m$ **=>** $0^n 1^n 2^m \in L(G)$

(i) $A \overset{n}{\Rightarrow} 0^n 1^n, \ \forall n \in N^*$

(ii) $B \overset{m}{\Rightarrow} 2^m, \ \forall m \in N^*$

2. $? \ L(G) \subseteq L$ **….**

Lol

Lol x2 - aproape ai reusit