Student Information

Name: Gürhan İlhan Adıgüzel

ID : 2448025

Answer 1

1. 𝐺1 = {𝑉1, Σ1, 𝑅1, 𝑆1} , V1 = { S1, a, b } , Σ1 = { a, b } and

R = { S1 S1aS1bS1bS1,

S1 S1bS1aS1bS1,

S1 S1bS1bS1aS1,

S1 e }

1. 𝐺2 = {𝑉2, Σ2, 𝑅2, 𝑆2} , V2 = { S2, K, L, a, b } , Σ2 = { a, b } and

R2 = { S2 K | L,

K KaKaKaK,

K KaKbKaK,

K KbKaKaK,

K L,

L LaLbL,

L LbLaL

L e }

1. PDA that accepts the L1 is :

Let 𝐺 = { 𝑉, Σ, 𝑅, 𝑆 } and we can construct a PDA M such that L(𝐺) = L(M).

Let M = ( K, Σ, Γ, Δ, s, F ) where

K = { q }

F = { q }

Σ = { a, b }

Γ = { K, a, b }

Δ = {((q,a,e),(q,K)),

((q,a,b),(q,a)),

((q,a,K),(q,Ka)),

((q,b,e),(q,b)),

((q,b,K),(q,a)), 

((q,b,a),(q,e))}









1. We define grammar G3 for L3 = L1 L2.

L() = L() L().  
Firstly ,we should check L1 andL2 have disjoint sets of non-terminals.  
 𝑉1 - Σ1 = { S1}  
 𝑉2 - Σ2 = { S2 , K, L}

We can conclude their sets of non-terminals are disjoint.

According to the Union property of context-free languages (Theorem 3.5.1):  
G3 = (V1 V2 {S}, , R1 R2 { SS1 , SS2}, S )   
V3  = V1 V2 {S} = { S1, S2, K, L, a, b }  
 = = { a, b }  
R3 = 𝑅1 𝑅2 { SS1 , SS2 } ={ S1 S1aS1bS1bS1 | S1bS1aS1bS1 | S1bS1bS1aS1 | S1 e} {S2 K | L, K KaKaKaK |KaKbKaK | KbKaKaK | L, L LaLbL | LbLaL | e}  
 { SS1 , SS2 }

Answer 2

1. Grammars such as G', with strings that have two or more distinct parse trees, are   
    called ambiguous. If we choose sample as “00111” we can draw 2 different   
    parse trees. So, 𝐺1  is ambiguous.

S S

A S A S

A 1 e 0 A 1 e

0 A 1 A 1

0 1 0 1

1. The unambiguous grammar for 𝐿(𝐺1) :

R = { S A

A AA | A1 | T

T 0T1 | 01 }

c) The leftmost derivation of the string “00111” :

S A A1 0T1 01

Parse Tree :

S 

A

A 1

0 T 1

0 1