Tutorial Letter 103/0/2024

Theoretical Computer Science III

COS3701

School of Computing

Assignment 02

BAR CODE

Define Tomorrow.

UNISA university of south africa

ASSIGNMENT 02
UNIQUE ASSIGNMENT NUMBER: 365071
STUDY MATERIAL: Cohen, chapters 16 - 18

Question 1 **[15]**

Build a DPDA to show that the language L = $\{(ba)^n a(ab)^{n-2} \mid n > 2\}$ is deterministic context free.

Question 2 **[15]**

Prove that the language L = $\{ba^n b^{2n} a^{n+1} \mid n > 0\}$ over the alphabet $\sum = \{a, b\}$ is non-context free. Use the pumping lemma with length.

Question 3 **[10]**

Let L_1 be the grammar generating $(aa)^*$. Let L_2 be the grammar generating $(a+b)^*ba(a+b)^*$.
First provide the grammars generating L_1 and L_2 respectively. Then apply the applicable theorem of Chapter 17 to determine L_1L_2.

Question 4 **[10]**

Decide whether the grammar given below generates any words.

$S \rightarrow XY$
$X \rightarrow SY$
$Y \rightarrow SX$
$X \rightarrow a$
$Y \rightarrow b$

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2024