L4.2 - Greibach Normal Form & CFG to GNF Conversion

Greibach Normal Form

A CFG is in Greibach Normal Form if the productions are in the following forms:

$$A \rightarrow b$$

$$A \rightarrow bC_1C_2 \ldots\ldots C_n$$

where $A, C_1, \ldots\ldots, C_n$ are Non-Terminals and b is a Terminal

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Steps to convert a given CFG to GNF:

Step 1: Check if the given CFG has any Unit Productions or Null Productions and Remove if there are any (using the Unit & Null Productions removal techniques discussed in the previous lecture)

Step 2: Check whether the CFG is already in Chomsky Normal Form (CNF) and convert it to CNF if it is not. (using the CFG to CNF conversion technique discussed in the previous lecture)

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$S \rightarrow CA \mid BB$

$B \rightarrow b \mid SB$

$C \rightarrow b$

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Replace:

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C with A_2

A with A_3

B with A_4

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We get:

$A_1 \rightarrow A_2 A_3 \mid A_4 A_4$

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Step 4: Alter the rules so that the Non -Terminals are in ascending order, such that,

If the Production is of the form $A_i \rightarrow A_j\ x$, then,

$i < j$ and should never be $i \geqslant j$

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↓

Left Recursion

Step 5: Remove Left Recursion

Questions????