**JUSTUS NJOGU**

**CIT-223-019/2017**

**Assignment 2**

**Instructions:** Answer all the questions and submit your work by **15th March 2020**.

1. Explain the terms below as used in context free grammars

1. Terminals-These are elementary symbols of the language defined by a formal grammar. They are literal symbols which may appear in the outputs of the production rules of a formal grammar and which cannot be changed using the rules of grammar. Applying the rules recursively to a source string of symbols will usually terminate in a final output string consisting only of terminal symbols
2. Non-terminals-They are also called syntactic variables and they can be replaced replaced by groups of terminal symbols according to the production rules.
3. Start symbol-It is a special non-terminal symbol that appears in the initial string generated by the grammar.
4. Productions- These are rules for replacing or rewriting non-terminal symbols(on the left side of the production) in a string with another non-terminal or terminal symbol (on the right side of the production).

2. Using an example, explain the meaning of a left recursive grammar

A left recursive grammar is a grammar whose innermost variable of the left hand side is the same as its right hand side.

Example:- E→ E+E / E x E / a

3. Explain why a left-recursive grammars method cannot handle top down parsing.

On look ahead of a token the parser cannot know if another token comes after the

look ahead. But the decision of which production to use depends on that Information.

Basically the issue with left recursive grammar is that if you have a left recursive non-terminal and if the input matches it,you cant necessarily know whether to use the recursion or not. Hence if a top-down parser will either fail when handling a left recursive grammar or will run out of space trying to track each possible branch.

4. Show how you can eliminate the left recursive part of the following grammar rule   
 A -> A α|β.

A -> βA’

A’ -> aA’| ɛ

5. Distinguish a regular language from non regular language

Regular languages are those that are described by regular grammar while non regular languages and to recognize them all you need is a look up table or a finite state automaton

while a non-regular language are not described by regular languages they need more sophisticated machines than FSAs to recognize them.