SSN COLLEGE OF ENGINEERING, KALAVAKKAM
Department of Computer Science and Engineering
UCS1503 - Theory of Computation
Tutorial
Due Date 08.10.2022

1. Consider the grammar G = ({S, A}, {a,b}, P,S), where P consists of
   S →aAS | b
   A → SbA | ba
   Write the derivation and draw its equivalent parse tree for w = abbbab

2. If G is a grammar S→SbS | a prove that G is ambiguous.

3. Consider the grammar S→aS | aSbS | ε. This grammar is ambiguous. Show that the string aab has two
       (a) Parse trees (b) Leftmost derivations (c) Rightmost derivations

4. For the grammar
   S →A1B
    A→0A| ε
    B→0B|1B| ε
   Give left most and right most derivation for the string 00101.

5. Construct CFG to generate $\{a^n b^n \mid n \in Z^+\}$

6. Consider the alphabet $\Sigma = \{a, b, (,), +,*,., \varepsilon \}$. Construct a context free grammar that generates all strings in Σ^* that are regular expressions over the alphabet $\{a,b\}$.

7. Convert the given CFG to CNF
           S → a | aA | B
           A → aBB | ε
           B → Aa | b

8. Convert the given CFG to GNF
           S → XB | AA
           A → a | BA | AB
           B → b
           X → a

9. Construct PDA
       (a) L=$\{a^n b^m c^n$ /m,n>=1} Acceptance by empting the stack
       (b) L=$\{wcw^R$ / w ∈ (a/b)*, c∈ a/b/epsilon} Acceptance by reaching the final state
       (c) L=$\{a^n b^m c^m d^n$ /m,n>=1} Acceptance by empting the stack and reaching the final state