1. **Implement a simple top-down parser for context-free grammars using Python.**

**Aim:**

To implement a simple top-down parser for context-free grammars using Python.

**Code:**

import nltk

from nltk import CFG

grammar = CFG.fromstring("""

S -> NP VP

NP -> Det N | N

VP -> V NP | V

Det -> 'the' | 'a'

N -> 'cat' | 'dog' | 'ball'

V -> 'chased' | 'saw' | 'ate'

""")

parser = nltk.RecursiveDescentParser(grammar)

sentence = input("Enter a sentence: ").lower()

tokens = sentence.split()

print("\nParsing Results:")

parsed = False

for tree in parser.parse(tokens):

print(tree)

parsed = True

if not parsed:

print("The input sentence is not valid according to the grammar.")

**Input:**

Enter a sentence: the cat chased a dog

**Output:**

Parsing Results:

(S (NP (Det the) (N cat)) (VP (V chased) (NP (Det a) (N dog))))

