

## CYK Algorithm for Context Free Grammar in Chomsky Normal Form (CNF)

*This program will fill out the table corresponding to Cocke-Younger-Kasami algorithm for context free grammar given. The main purpose of the program is to determine if the given language is in the context free grammar. The context grammar given as an input should be in Chomsky Normal Form.*

### Understanding the format of input/output

The format of the file should correspond as shown below (number represents line number).

1. Text "membership"
2. List of variables separated by the comma
3. List of terminals separated by the comma
4. Starting variable
5. Context Free Grammar rules (in Chomsky Normal Form)
  - a. E.g.  $S \rightarrow AB \mid BC$  should be
    - i.  $S \rightarrow AB$
    - ii.  $S \rightarrow BC$
  - b. Epsilon is represented by the word "epsilon"

Last Line. Ends with the word "end"

Example.

#### Context Free Grammar in CNF

```
T → AB | BA | SS | AC | BD | ε
S → AB | BA | SS | AC | BD
C → SB
D → SA
A → a
B → b
```

#### File Format

```
membership
A,B,C,D,S,T
a,b
T
T->A B
T->B A
T->S S
T->A C
T->B D
T->epsilon
S->A B
S->B A
S->S S
S->A C
S->B D
C->S B
D->S A
A->a
B->b
end
aab
ababab
ab
abab
end
```

### **Testing/Running the program**

Simply download every file 'CYKAlgo' folder and run the 'main.py' from a console using the command:

- `python3 main.py < filename.in`

Premade input example is provided in the folder.

### **Additional Information**

When designing this program recursion wasn't used to clearly understand the time complexity of this algorithm when running through the loop.