# Checking whether $w = w_1 w_2 \cdots w_n$ can be generated from a CFG

Input: $w = w_1 w_2 \cdots w_n$

1. If $w = \varepsilon$ and $S \to \varepsilon$ is a rule, accept.
2. For $i = 1$ to $n$
3. For each variable $A$
   Check whether $A \to b$ is a rule, $b = w_i$
   If so, table$(i,i) \leftarrow A$
4. For $l = 2$ to $n$ // $l$ – length of a substring
5. For $i = 1$ to $n-l+1$ // $i$ – starting index
6. Let $j = i+l-1$ // $j$ – ending index
7. For $k = i$ to $j-1$
8. For each rule $A \to BC$
9. If table$(i,k)$ contains $B$
   table$(k+1,j)$ contains $C$
10. put $A$ in table$(i,j)$
11. If $S$ is in table$(1,n)$, accept;
    otherwise, reject.