

Problem

Convert the CFG G given in Exercise 2.3 to an equivalent PDA, using the procedure given in Theorem 2.20.

THEOREM 2.20

A language is context free if and only if some pushdown automaton recognizes it.

Step-by-step solution

Step 1 of 2

CFG stands for context free grammar. It is a set of recursive rules which are used to create a string pattern.

- A CFG contains set of terminals and non-terminals.
- Generally, Non terminals or variables are represented with capital alphabets whereas terminals are represented with small alphabets.
- The languages which use context free grammar are called as context free language.
- Machines which recognize the context free language are called as **push down automata**. It is used to provide additional power to CFG.

[Comment](#)

Step 2 of 2

Conversion of CFG to PDA:

Consider the following context free grammar:

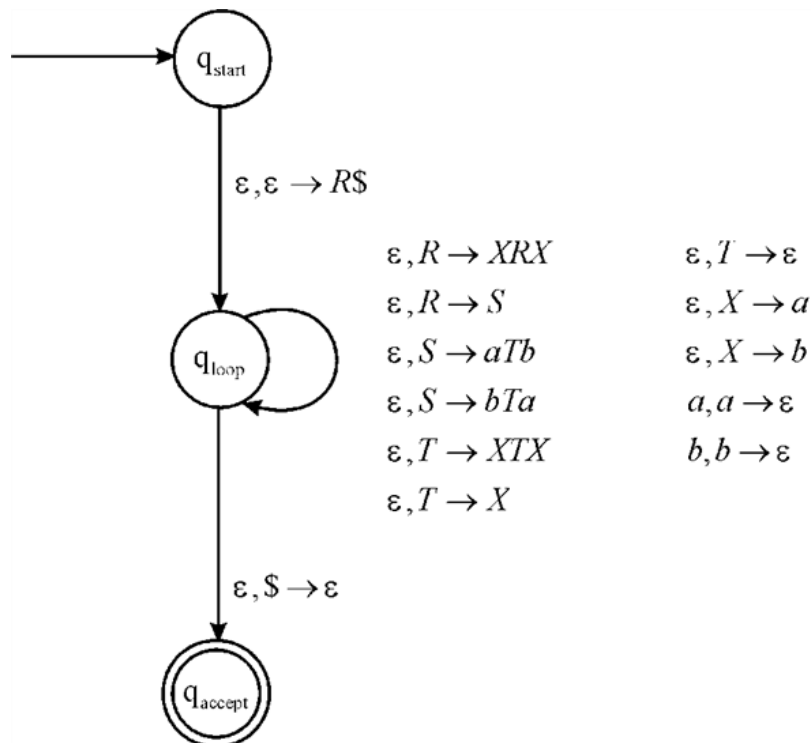
$$R \rightarrow XRX \mid S$$

$$S \rightarrow aTb \mid bTa$$

$$T \rightarrow XTX \mid X \mid \varepsilon$$

$$X \rightarrow a \mid b$$

Consider the following diagram to represent the equivalent PDA of the above CFG:



- The above transition rule allows someone to reduce the grammar that is to replace non-terminals or variables to the right-hand side terminals.
- Transition for the terminal symbols such as (a, b) permits someone for matching the input symbol to the terminal symbol.
- A path of PDA of string w can only be accepted if an input string w can only be generated by grammar G .