CISS362: Introduction to Automata Theory, Languages, and Computation
Assignment 22

The transition of a PDA looks like this:

$$(a, b \to c)$$

which means: "read a, replace b on the top of the stack with c, and go to the next state". Note that a or b or c can be ϵ. For instance this is a valid transition:

$$(\epsilon, \epsilon \to \epsilon)$$

which means "don't any input, don't change the stack, go to the next state." The transition

$$(a, \epsilon \to b)$$

means "read a, put b on top of the stack, and go to the next state ". The transition

$$(a, b \to \epsilon)$$

means "read a, remove b from the top of the stack, and go to the next state". Etc.

The characters used in the stack can be different from the input characters. For instance you have already seen that we can use the \$ character to mark the bottom of the stack. If Σ denotes the input characters and Γ denotes the characters used in the stack, then a transition looks like this

$$(a, b \to c)$$

where $a \in \Sigma \cup \{\epsilon\}$ and $b, c \in \Gamma \cup \{\epsilon\}$.

Q1. Construct, if possible, a PDA that accepts

$$L = \{a^m b^n \mid m \neq n\}$$

[HINT: Rewrite the language as a union of two, design two PDAs, and finally construct a PDA that accepts the union.]

SOLUTION.

Q2. Construct, if possible, a PDA that accepts

$$L = \{a^m b^m a^n b^n \mid m \geq 0, n \geq 0\}$$

[HINT: Rewrite the language as a concatenation of two, design two PDAs, finally construct a PDA for the concatenation.]

SOLUTION.