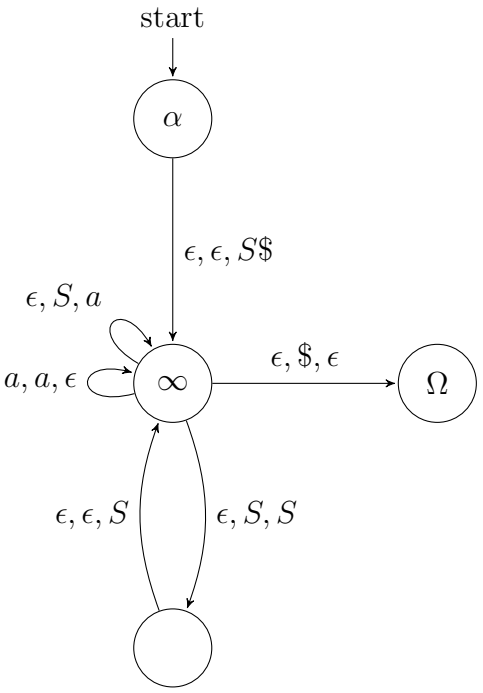
COSC 312 Homework #6

# Example PDA

This is an example of a PDA, more of the form of one crafted from a (very simple) CFG. using the TIKZ library from LaTeX (see hwk6.tex file for coding).




# 1 CNF Step 1

Perform step one of converting the following CFG into CNF by adding a new start state $S$. $V = \{A, B\}$, $\Sigma = \{0, 1\}$, $S = A$, $R =$

$$A \rightarrow BAB \mid B \mid 1 \mid \epsilon$$
$$B \rightarrow 00 \mid \epsilon$$

# 2 CNF Step 2

Perform step two of converting the following CFG's into CNF by removing $\epsilon$ rules.

### 2.a

$V = \{S, A, B, C\}$, $\Sigma = \{a, b, c\}$, $S = S$, $R =$

$$\begin{aligned} S &\rightarrow A \\ A &\rightarrow AaB \\ B &\rightarrow b \mid C \mid \epsilon \\ C &\rightarrow CC \mid c \mid \epsilon \end{aligned}$$

### 2.b

$V = \{S, A, B\}$, $\Sigma = \{a, b\}$, $S = S$, $R =$

$$\begin{aligned} S &\rightarrow A \\ A &\rightarrow AA \mid AB \mid B \mid a \\ B &\rightarrow BB \mid b \mid \epsilon \end{aligned}$$

## 3 CNF Step 3

Perform step three of converting the following CFG's into CNF by removing unit rules.

### 3.a

$V = \{S, A, B\}$, $\Sigma = \{a, b\}$, $S = S$, $R =$

$$\begin{aligned} S &\rightarrow A \\ A &\rightarrow AA \mid AB \mid A \mid B \mid aB \\ B &\rightarrow BB \mid Bb \mid b \end{aligned}$$

### 3.b

$V = \{S, A, B, C, D\}$, $\Sigma = \{a, b, c\}$, $S = S$, $R =$

$$
\begin{aligned}
S &\rightarrow A \mid \epsilon \\
A &\rightarrow BC \\
B &\rightarrow BD \mid bb \\
C &\rightarrow CD \mid cc \\
D &\rightarrow B \mid C
\end{aligned}
$$

## 4 CNF Step 4

Perform step four of converting the following CFG into CNF by removing remaining rules.

### 4.a

$V = \{S, A, B\}$, $\Sigma = \{a, b\}$, $S = S$, $R =$

$$
\begin{aligned}
S &\rightarrow AAB \mid aBb \mid ABB \mid Ab \\
A &\rightarrow AAB \mid aBb \mid ABB \mid Ab \\
B &\rightarrow BB \mid Bb \mid b
\end{aligned}
$$

## 5 CFG to PDA Conversion

Using the technique that was covered in class, convert the following CFG to a PDA:

$V = \{A, B, C, D\}$,$\Sigma_\epsilon = \{x, \surd, +, (, )\} \cup \{\epsilon\}$, $S = A$,$R =$

$$
\begin{aligned}
A &\rightarrow B \mid C \mid x \\
B &\rightarrow \surd C \mid \surd A \\
C &\rightarrow (D) \mid (A) \\
D &\rightarrow A + A
\end{aligned}
$$