Theory of Computation HW3 CFGs and PDAs Ryzeson Maravich

Give the context-free grammars that generate the following languages and construct state diagrams of push-down automata for each. In all parts, the alphabet Σ is $\{0, 1\}$.

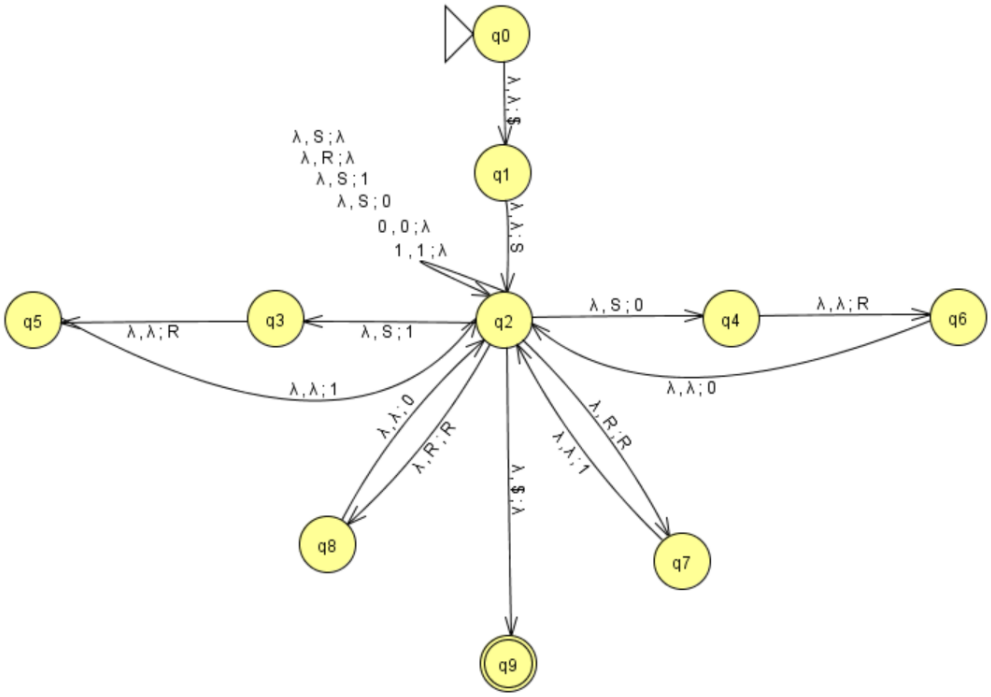
1

$\{w|w$ starts and ends with the same symbol$\}$.

CFG:

$$S \to 0R0|1R1|0|1|\epsilon$$
$$R \to 0R|1R|\epsilon$$

PDA:



Note that this PDA is a formal construction, so appears much more complicated than the others.

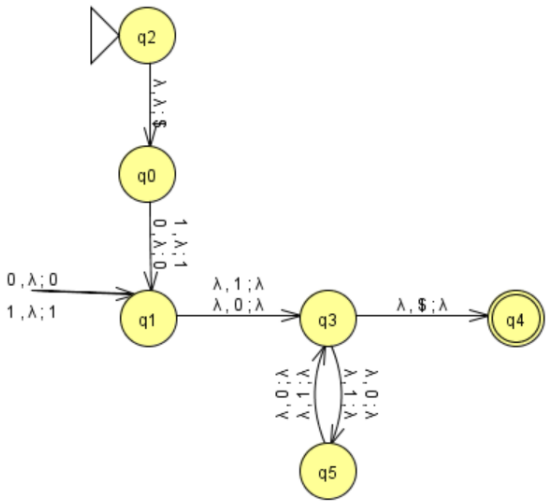
2

$\{w|$ the length of w is odd$\}$.

CFG:

$$S \to 0R|1R$$
$$R \to 00R|01R|10R|11R|\epsilon$$

PDA:



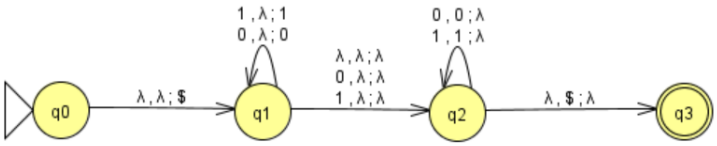
3

$\{w|w = w^R\}$.

CFG:

$$S \to 0S0|1S1|1|0|\epsilon$$

PDA:



I affirm that I have upheld the highest principles of honesty and integrity in my academic work and have not witnessed a violation of the honor code.