

Automata Theory: Solutions 9

							X
							X
							X
							X
							X
							X
							X
					X		X
					X		X
					X		X
			X		X	X	X
			X		X	X	X
			X		X	X	X
			X	X	X	X	X
	X	X	X	X	X	X	X
	4	5	6	7	8	9	10
	grades						

Problem 1

Give Chomsky and Greibach normal forms for this grammar:

$$\begin{array}{l} S \rightarrow AB \\ A \rightarrow aAa \mid a \\ B \rightarrow Bb \mid b \end{array}$$

Chomsky normal form:

$$\begin{array}{l} S \rightarrow AB \\ A \rightarrow CX \mid a \\ C \rightarrow XA \\ B \rightarrow BY \mid b \\ X \rightarrow a \\ Y \rightarrow b \end{array}$$

Greibach normal form:

$$\begin{array}{l} S \rightarrow aAB \mid aB \\ A \rightarrow aXA \mid aX \\ B \rightarrow bB \mid b \\ X \rightarrow a \end{array}$$

Problem 2

Construct deterministic PDAs for the following languages:

- (a) $\{a^n b^m a^n : n \geq 1 \text{ and } m \geq 1\}$
 (b) $\{a^n b^m a^k : 1 \leq k \leq n \text{ and } m \geq 1\}$

