Theory of Automata and Formal Language

Lecture-3

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Examples

Determine the languages generated by the following grammars:-

1. $S \rightarrow 0S1/0A1$, $A \rightarrow 1A/1$
2. $S \rightarrow aA$, $A \rightarrow bS$, $S \rightarrow \epsilon$
3. $S \rightarrow 0S1/0A/0/1B/1$, $A \rightarrow 0A/0$, $B \rightarrow 1B/1$
4. $S \rightarrow 0SBA/01A$, $AB \rightarrow BA$, $1B \rightarrow 11$, $1A \rightarrow 10$, $0A \rightarrow 00$
5. $S \rightarrow 0S1/0A1$, $A \rightarrow 1A0/10$
6. $S \rightarrow 0A/1S/0/1$, $A \rightarrow 1A/1S/1$

Examples

Construct the grammars which generates the following languages:-

1. $L(G) = \{ a^n b a^m \mid m, n \geq 1 \}$
2. $L(G) =$ The set of all palindromes over $\{a, b\}$
3. $L(G) = \{ wcw^T \mid w \in \{a, b\}^* \}$
4. $L(G) = \{ a^n b^n c^i \mid n \geq 1 \text{ and } i \geq 0 \}$
5. $L(G) = \{ a^j b^n c^n \mid n \geq 1 \text{ and } j \geq 0 \}$
6. $L(G) = \{ a^n b^n c^n \mid n \geq 1 \}$

Examples

Construct the grammars which generates the following languages:-

1. $L(G) = \{ w \in \{a, b\}^*$! The number of a's in w is divisible by 3\}

2. $L(G) = \{ w \in \{a, b\}^*$! w has an equal number of a's and b's\}

3. $L(G) = \{ w \in \{a, b\}^*$! $n_a(w) > n_b(w)\}$

4. $L(G) = \{ w \in \{a, b\}^*$! $n_a(w) \neq n_b(w)\}$

5. $L(G) = \{ 0^m 1^n 0^n 1^m$! m,n $\geq 1 \}$

6. $L(G) = \{ 0^n 1^{2n}$! n $\geq 1\}$

7. $L(G) = \{ 0^n 1^n$! n $\geq 1\} \cup \{ 1^m 0^m$! m $\geq 1\}$

8. $L(G) = \{ 0^n 1^m 0^n$! m,n $\geq 1\} \cup \{ 0^n 1^m 2^m$! m,n $\geq 1\}$