

CSCI338 HW3

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1 Context-Free Grammers

1.1 $\{ \mathbf{a}^n \mathbf{b}^m \mid \mathbf{n} \neq 2\mathbf{m} \}$

$S \rightarrow \mathbf{aaSb} \mid \mathbf{A} \mid \mathbf{B}$

$\mathbf{A} \rightarrow \mathbf{aA} \mid \mathbf{a}$

$\mathbf{B} \rightarrow \mathbf{bB} \mid \mathbf{b}$

1.2 $\{ \mathbf{a}^i \mathbf{b}^j \mathbf{c}^k \mid \mathbf{i}, \mathbf{j}, \mathbf{k} \geq 0 \text{ } \mathbf{j} = \mathbf{k} \text{ or } \mathbf{j} = \mathbf{i} \}$

$S \rightarrow S_1 \mid S_2$

$S_1 \rightarrow \mathbf{abS_1} \mid \mathbf{A} \mid \epsilon$

$\mathbf{A} \rightarrow \mathbf{cA} \mid \mathbf{c} \mid \epsilon$

$S_2 \rightarrow \mathbf{a S_2} \mid \mathbf{B} \mid \epsilon$

$\mathbf{B} \rightarrow \mathbf{Bbc} \mid \mathbf{bc} \mid \epsilon$

1.3 $\{ \mathbf{a}^n \mathbf{b}^m \mid \mathbf{n} = 3\mathbf{m} \}$

$S \rightarrow \mathbf{aaaSb} \mid \epsilon$

1.4 $\{ \mathbf{a}^n \mathbf{b}^m \mid \mathbf{n} \leq \mathbf{m} + 3 \}$

$S \rightarrow \mathbf{aSb} \mid \mathbf{A}$

$\mathbf{A} \rightarrow \mathbf{a} \mid \mathbf{aa} \mid \mathbf{aaa} \mid \mathbf{B}$

$\mathbf{B} \rightarrow \mathbf{bB} \mid \epsilon$

2 Ambiguous Grammer

Can I construct an identical string using two different paths?

Lets construct the string aab

$S \rightarrow aaB \rightarrow b \rightarrow aab$

$S \rightarrow AB:$

$A \rightarrow aA \rightarrow aa$

$B \rightarrow b$

$\rightarrow aab$

This language is ambiguous

3 CFG to PDA