

CIT 596 Recitation, Week 6

Honglin Zhang

Feb 28, 2014

[Exercise] @sipser13 [p. 155] exercise 2.4

Give context-free grammars that generate the following languages. $\Sigma = \{0, 1\}$.

- ▶ $\{w \mid w \text{ contains at least three 1s}\}$
- ▶ $\{w \mid \text{the length of } w \text{ is odd and its middle symbol is a 0}\}$
- ▶ The empty set

[Exercise] @sipser13 [p. 155] exercise 2.3

Answer each part for the following context-free grammar G .

$$R \rightarrow XRX|S$$

$$S \rightarrow aTb|bTa$$

$$T \rightarrow XTX|X|\varepsilon$$

$$X \rightarrow a|b$$

- ▶ What are the variables of G ?
- ▶ What are the terminals of G ?
- ▶ Which is the start variable of G ?
- ▶ Give three strings in $L(G)$
- ▶ Give three strings *not* in $L(G)$
- ▶ True or False: $T \Rightarrow aba$
- ▶ True or False: $T \xRightarrow{*} aba$
- ▶ True or False: $T \Rightarrow T$

[Continue]

$$R \rightarrow XRX|S$$

$$S \rightarrow aTb|bTa$$

$$T \rightarrow XTX|X|\varepsilon$$

$$X \rightarrow a|b$$

- ▶ True or False: $T \xRightarrow{*} T$
- ▶ True or False: $XXX \xRightarrow{*} aba$
- ▶ True or False: $X \xRightarrow{*} aba$
- ▶ True or False: $T \xRightarrow{*} XX$
- ▶ True or False: $T \xRightarrow{*} XXX$
- ▶ True or False: $S \xRightarrow{*} \varepsilon$
- ▶ Give a description in English of $L(G)$

Review

What to Cover

- ▶ NFA \rightarrow DFA
- ▶ NFA \rightarrow RegEx
- ▶ RegEx \rightarrow NFA
- ▶ Design an NFA/DFA
- ▶ Design a CFG