

HW 5

2.4, 2.6, 2.16, 2.25

due Friday

# Regular Grammars

right-linear

$$B \rightarrow a$$

$$B \rightarrow aC$$

$$B \rightarrow \epsilon$$

} all rules  
look like  
these



$$w \in \{0, 1\}^+$$

$$L = \{0, 1\}^+$$

$$0^P 1 0^P$$

$$\underbrace{0^P}_{w} \underbrace{1}_{t} \underbrace{0^P}_{w} \in L$$

Chomsky normal form

every rule is

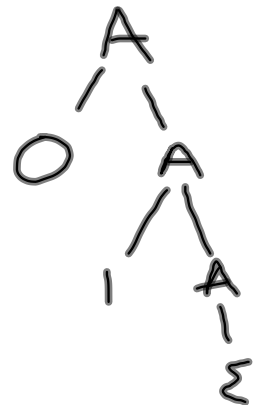
$$A \rightarrow BC$$

$$A \rightarrow a$$

$$S \rightarrow \epsilon \quad \text{where } S \text{ is} \\ \text{start variable}$$

Any string of 0's and 1's

$$A \rightarrow \epsilon \mid \emptyset A \mid 1A$$



all strings start w/ 000

$$B \rightarrow 000A$$

ends w/ 111



$$C \rightarrow A111$$

starts w/ 000 and ends w/ 111



$$D \rightarrow BC$$

$E$  starts w/ 000 or ends w/ 111

$E \rightarrow B$	$E \rightarrow B \mid C$
$E \rightarrow C$	

starts and ends w/ 1

$$F \rightarrow \underline{1} A \underline{1} \mid \underline{1}$$

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doesn't (start and end) w/ 1

$$G \rightarrow 0 A 0 \mid 0 A \underline{1} \mid \underline{1} A 0 \mid 0$$

$$\{ ww^R \mid w \in \{0,1\}^* \}$$

$$H \rightarrow |H| \mid 0H0 \mid \varepsilon \quad \checkmark \quad |1001|$$

$$X \quad |0101| \quad |0101|$$

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$$\{ wxw^R \mid w \in \{0,1\}^* \}$$

$$X \in \{a,b\}^*$$

$$I \rightarrow 0I0 \mid 1I1 \mid \varepsilon \quad \checkmark \quad 01abba0$$

$$J \rightarrow aJa \mid bJb \mid \varepsilon \quad \checkmark \quad \begin{matrix} \varepsilon \\ a \quad b \quad a \\ \hline 0 \quad \hline 0 \end{matrix}$$

$$\{ a^i b^j c^k \mid i=j \text{ or } j=k \text{ or } i=k \}$$

$$S \rightarrow A \mid B \mid C$$

$$i=j \quad A \rightarrow DE$$

$$D \rightarrow aD \mid b \mid \varepsilon$$

$$E \rightarrow cE \mid \varepsilon$$

$$D: a^n b^n$$

$$E: c^*$$