

CS 3186

Assignment #10

- (I) Define/Describe a context free grammar G and the language $L(G)$
- (II) Define/Describe a sentential form in a derivation.
- (III) Differentiate between a leftmost and a rightmost derivation sequence.
- (IV) Define an ambiguous grammar.
- (V) Sometimes only the production rules of a grammar are defined with the starting nonterminal given by the first rule.

$R \rightarrow XRX \mid S$

$S \rightarrow aTb \mid bTa$

$T \rightarrow XTX \mid X \mid \lambda$

$X \rightarrow a \mid b$

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| a. What are the variables of G ? | i. True or False: $T \Rightarrow^* T$. |
| b. What are the terminals of G ? | j. True or False: $XXX \Rightarrow^* aba$. |
| c. Which is the start variable of G ? | k. True or False: $X \Rightarrow^* aba$. |
| d. Give three strings of varying lengths in $L(G)$. | l. True or False: $T \Rightarrow^* XX$. |
| e. Give three strings <i>not</i> in $L(G)$. | m. True or False: $T \Rightarrow^* XXX$. |
| f. True or False: $T \Rightarrow aba$. | n. True or False: $S \Rightarrow^* \lambda$. |
| g. True or False: $T \Rightarrow^* aba$. | |
| h. True or False: $T \Rightarrow T$. | |

- (v) Using the rule of the above grammar, using leftmost derivation (or using a rightmost derivation) show step by step the partial derivation trees, yield for each of the sentential forms in deriving aababa (as described in the notes)

(VI) Show G is ambiguous, give two leftmost, two rightmost & two derivation trees

G = ({S,A,B,,D}, {a,b,c},S,P)

Where P, the production rules are:

$$S \rightarrow BC \mid AD$$

$$B \rightarrow aBb \mid \lambda$$

$$C \rightarrow cC \mid \lambda$$

$$A \rightarrow aA \mid \lambda$$

$$D \rightarrow bDc \mid \lambda$$