

This assignment asks you to prepare written answers to questions on context-free grammars. Each question has a short answer. You may discuss this assignment with other students and work the problems together. However, your writeup should be your own individual work. Remember written assignments are to be turned in in class on the date due.

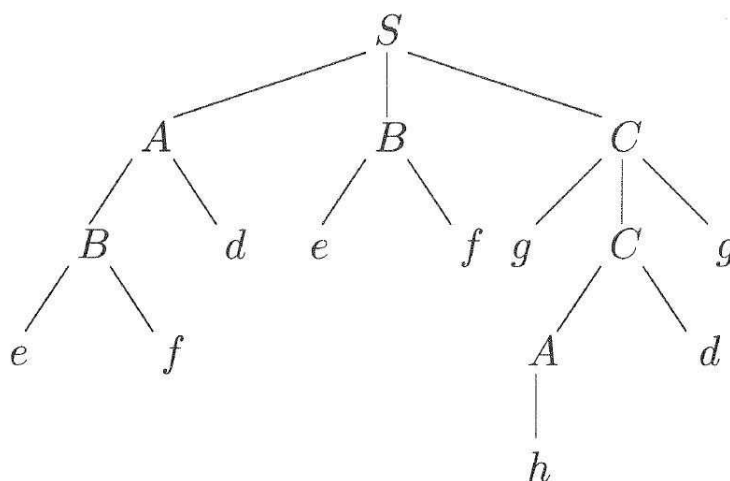
1. Given the Grammar  $G =$

- $A \rightarrow Ba \mid bC$
- $B \rightarrow d \mid eBf$
- $C \rightarrow gC \mid g$

Determine which of the following strings are in  $L(G)$ . Construct parse trees for those that are.

- bg
- bffd
- bggg
- edfa
- eedffa
- faae
- defa

2. Given the following parse tree,



- (a) Construct the corresponding rightmost derivation
- (b) Construct as much of the grammar as can be determined from the parse tree

3. Given the grammar

- $S \rightarrow aS \mid SB \mid d$
- $B \rightarrow Bb \mid c$

Show that this grammar is ambiguous by showing two parse trees for the string aadcbb

4. Our usual expression grammar (Old Faithful)

- $E \rightarrow E + T \mid E - T \mid T$
- $T \rightarrow T * F \mid T / F \mid F$
- $F \rightarrow (E) \mid i$

can't be used as is in a predictive parser because it has left recursion. Someone had the idea that he could remove left recursion from this grammar by changing it to

- $E \rightarrow T + E \mid T - E \mid T$
- $T \rightarrow F * T \mid F / T \mid F$
- $F \rightarrow (E) \mid i$

Show that this isn't such a good idea by

- (a) drawing parse trees for  $a - b - c$  using both the original grammar and the revised grammar and
- (b) using the trees as a guide to determine the results of the corresponding computations if  $a = 3$ ,  $b = 5$ ,  $c = 8$ .

5. Find the *FIRST* and *FOLLOW* sets for the grammar

- $S \rightarrow ABC$
- $A \rightarrow a \mid Cb \mid \epsilon$
- $B \rightarrow c \mid dA \mid \epsilon$
- $C \rightarrow e \mid f$