

## CST 320 – Assignment 3 part 1

Wilsonville, Fall 2017

Note: In this assignment, non-terminals are upper case and terminals are lower case.

1. Given the grammar  $G =$

$A \rightarrow bgB \mid dA \mid g$

$B \rightarrow Ca \mid gA$

$C \rightarrow aC \mid bdA \mid b$

Determine and indicate which of the following strings are in the language defined by  $G$  and which are not. Construct parse trees for those that are in the language.

*bgg NOT IN GRAMMAR*

*ddboggg*

$A \rightarrow dA \rightarrow ddA \rightarrow ddbgB \rightarrow ddbggA \rightarrow ddboggg$

*bgaba*

$A \rightarrow bgB \rightarrow bgCa \rightarrow bgaCa \rightarrow bgaba$

*bggdg*

$A \rightarrow bgB \rightarrow bggA \rightarrow bggdA \rightarrow bggdg$

*dad NOT IN GRAMMAR*

*bgba*

$A \rightarrow bgB \rightarrow bgCa \rightarrow bgba$

*abd NOT IN GRAMMAR*

*dbga NOT IN GRAMMAR*

*Parse trees at end*

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2. Given the following grammar

$$S \rightarrow aSbS \mid bSaS \mid \lambda$$

Show that this grammar is ambiguous by constructing two different left-most derivations for the sentence “abab”.

S  
a**S**bS  
ab**S**a**S**bS  
abaSbS  
ababS  
abab

S  
a**S**bS  
abS  
aba**S**bS  
ababS  
abab

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3. Using the following grammar:

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

Construct parse trees and left-most derivations for the following expressions:

a)  $i * (i + i)$

E

T

T \* F

F \* F

i \* F

i \* (E)

i \* (E + T)

i \* (T + T)

i \* (F + T)

i \* (i + T)

i \* (i + F)

i \* (i + i)

b)  $i - i + i$

E

E + T

E - T + T

T - T + T

F - T + T

i - T + T

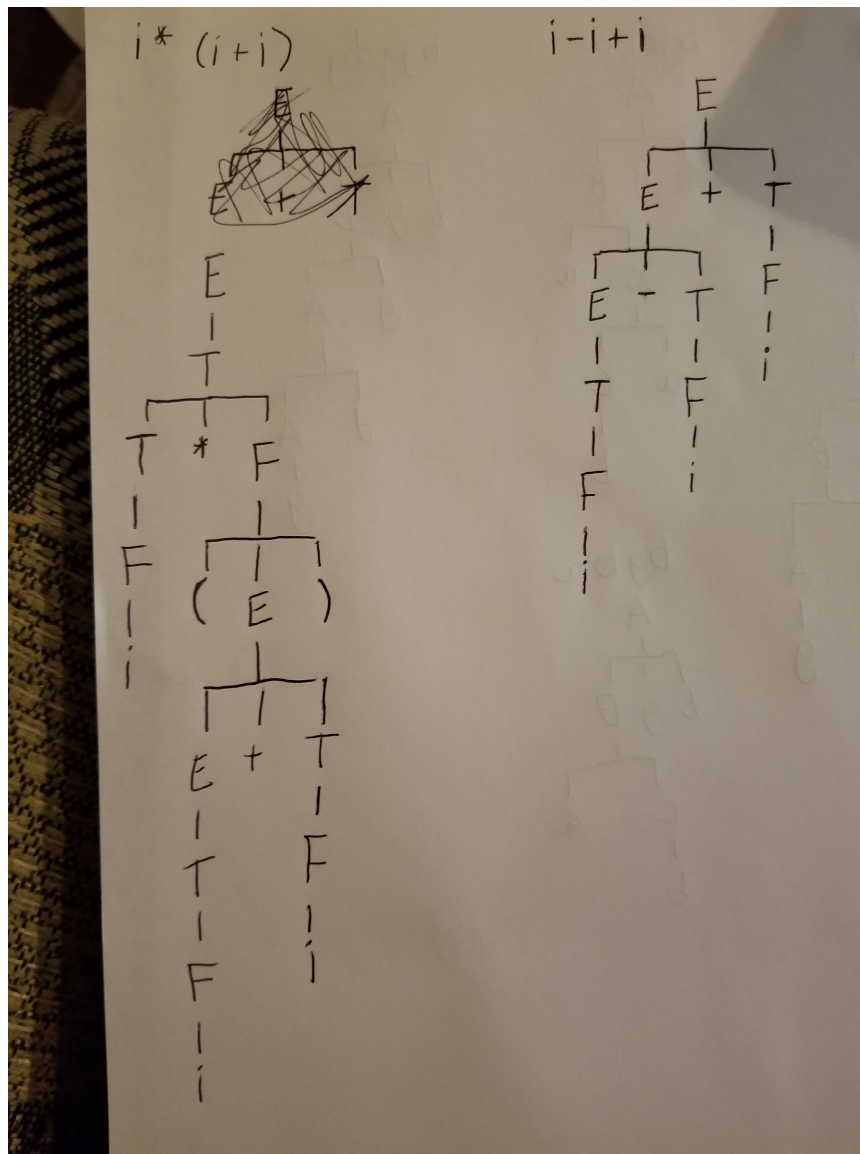
i - F + T

i - i + T

i - i + f

i - i + i

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