Mid-term 2 Exam: CSC 340

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Student Name:

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Exercise 1

Given the grammar $A \rightarrow (A)A|\epsilon$

1. Construct First and Follow sets for the nonterminal A
2. show that this grammar is LL(1).

Exercise 2

Consider the following grammar:

$S \rightarrow A\ C\$$
$C \rightarrow c|\epsilon$
$A \rightarrow a\ B\ C\ d|B\ Q$
$B \rightarrow b\ B|\epsilon$
$Q \rightarrow q|\epsilon$

1. Construct First and Follow sets for each nonterminal in the grammar
2. Build and LL(1) parse table based on the grammar
3. Continue tracing the operation of an LL(1) parser for the grammar on the following input: *abbdc*\$

Remaining input	Action	Stack
abbdc\$	$S \rightarrow A\ C\$$	S
abbdc\$	...	$A\ C\$$
...	...	...

Exercise 3

Consider the following attribute grammar

Grammar rule	Semantic rule
$E \rightarrow E\#T$	$E.value = E.value * T.value$
$\quad \mid T$	$E.value = T.value$
$T \rightarrow T\&F$	$T.value = T.value + F.value$
$\quad \mid F$	$T.value = F.value$
$F \rightarrow num$	$F.value = num.value$

Knowing that & operator has more priority than # operator

1. Draw the parse tree for the following input 2#3&5#6&4
2. What is the value of $E.value$ when the evaluation is finished

Exercise 4

Give the sequence of code instructions corresponding to the arithmetic expressions:

$$T = a * b + c * d * 2$$

by using the following machine code:

- LOD x: load value of variable x.
- LDC c: load constant c.
- STO: store top of the stack to address below top.
- MUL: Multiplication
- ADD: Addition.