CS101 Homework Assignment 8

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1. **Academic Honesty Declaration**

   In the process of finishing this homework:

   (a) I had conversations about the contents and solutions of this assignment with the following people: Melat Feseha

   (b) I consulted the following resources, such as books, articles, webpages:

   - https://wch.github.io/latexsheet/
   - https://en.wikibooks.org/wiki/LaTeX/Basics

   (c) I did not look at the answers of any other students.

   (d) I did not provide my answers to other students.

2. **Writing Component**

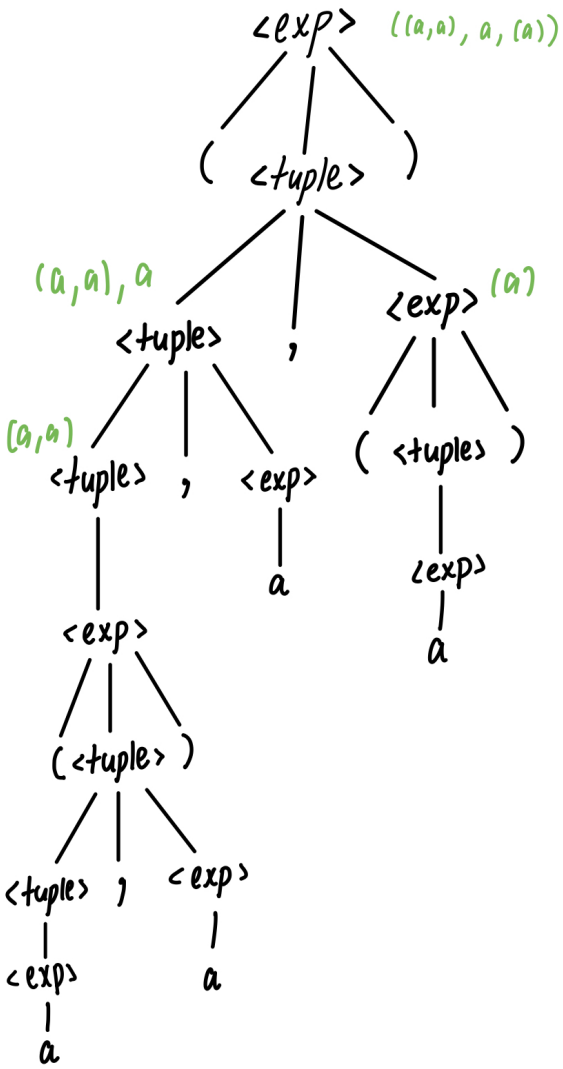
(a) **Parsing Tuples**

Given the following BNF:

```
<exp> ::= ( <tuple> ) | a
<tuple> ::= <tuple>, <exp> | <exp>
```

Draw the parse tree for $((a, a), a, (a))$.

Solution:



(b) **Parsing Tuples**

```
<exp> ::= ( <tuple> )            (1)
<exp> ::= a                      (2)
<tuple> ::= <exp> <expTail>      (3)
<expTail> ::= , <exp> <expTail>  (4)
<expTail> ::= ϵ                  (5)
```

Compute First and Follow for each non-terminal of this grammar and build a table like the one we did in class to guide the derivation of your recognizer. Like the one constructed in class, rows correspond to non-terminals, while columns correspond to terminals. The entries should be rule numbers from above. Show that the grammar follows the first and second rules of predictive parsing. The simplest way to do this is to show that no entry in the table has more than one rule associated with it.

Solution:

$FIRST(< exp >) = \{"(" \ , \ a\}$
$FIRST(< tuple >) = \{"(" \ , \ a\}$
$FIRST(< expTail >) = \{"," \ , \ a\}$

$FOLLOW(< exp >) = \{EOF \ , \ ")", \ ","\}$
$FOLLOW(< tuple >) = \{ \ ")"\}$
$FOLLOW(< expTail >) = \{ \ ")"\}$

	"("	")"	a	","	EOF
<exp>	1		2		
<tuple>	3		3		
<expTail>		5		4	

As we can observe in the table, no entry as more than one rule associated with it which means that this grammar follows the first and second rules of predictive parsing.

Extra