

Assignment 6

- The grammar is ambiguous since it can evaluate one string in multiple ways.

For example, the string 'let x = 1 in x; x'

Parse Deviation 1

$\langle \text{expr} \rangle \rightarrow \text{let } \langle \text{id} \rangle = \langle \text{expr} \rangle \text{ in } \langle \text{expr} \rangle$
 $\rightarrow \text{let } x = \langle \text{expr} \rangle \text{ in } \langle \text{expr} \rangle$
 $\rightarrow \text{let } x = \langle \text{dig} \rangle \text{ in } \langle \text{expr} \rangle$
 $\rightarrow \text{let } x = 1 \text{ in } \langle \text{expr} \rangle$
 $\rightarrow \text{let } x = 1 \text{ in } \langle \text{expr} \rangle; \langle \text{expr} \rangle$
 $\rightarrow \text{let } x = 1 \text{ in } \langle \text{id} \rangle; \langle \text{expr} \rangle$
 $\rightarrow \text{let } x = 1 \text{ in } x; \langle \text{expr} \rangle$
 $\rightarrow \text{let } x = 1 \text{ in } x; \langle \text{id} \rangle$
 $\rightarrow \text{let } x = 1 \text{ in } x; x$

Parse Deviation 2

$\langle \text{expr} \rangle \rightarrow \langle \text{expr} \rangle; \langle \text{expr} \rangle$
 $\rightarrow \text{let } \langle \text{id} \rangle = \langle \text{expr} \rangle \text{ in } \langle \text{expr} \rangle; \langle \text{expr} \rangle$
 $\rightarrow \text{let } x = \langle \text{expr} \rangle \text{ in } \langle \text{expr} \rangle; \langle \text{expr} \rangle$
 $\rightarrow \text{let } x = \langle \text{dig} \rangle \text{ in } \langle \text{expr} \rangle; \langle \text{expr} \rangle$
 $\rightarrow \text{let } x = 1 \text{ in } \langle \text{expr} \rangle; \langle \text{expr} \rangle$
 $\rightarrow \text{let } x = 1 \text{ in } \langle \text{id} \rangle; \langle \text{expr} \rangle$
 $\rightarrow \text{let } x = 1 \text{ in } x; \langle \text{expr} \rangle$
 $\rightarrow \text{let } x = 1 \text{ in } x; \langle \text{id} \rangle$
 $\rightarrow \text{let } x = 1 \text{ in } x; x$

2. $\langle \text{id} \rangle ::= a | b | c | \dots | z$

$\langle \text{dig} \rangle ::= 0 | 1 | 2 | \dots | 9$

$\langle \text{expr} \rangle ::= \langle \text{term} \rangle$

| let $\langle \text{id} \rangle = \langle \text{expr} \rangle$ in $\langle \text{expr} \rangle$

| $\langle \text{expr} \rangle; \langle \text{expr} \rangle$

| begin $\langle \text{expr} \rangle$ end

$\langle \text{term} \rangle ::= ()$

| $\langle \text{dig} \rangle$

| $\langle \text{id} \rangle$

| $\langle \text{term} \rangle; \langle \text{term} \rangle$

I made it unambiguous by adding the nonterminal 'term' which takes care of the simplification of a digit, identifier, or semicolon