

# Homework 6: Formal Languages I

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## Part 1.

1.

L

L

Ident

“x”

“->”

L

A

Ident

“y”

A

Ident

“z”

2.

String: “z->z”

L

L

A

Ident

“z”

“->”

Ident

“z”

String: “(x)y”

L

L

A

“(“

L

A

Ident

“x”

“)“

A

Ident

“y”

String: “(y)”

L

A

“(“

L

A

Ident

“y”

“)”

3.

The string “x y -> z” is not in the language because there are no rules that allow more than one letter to be before a “->” sign. The only option to get “->” places an Ident before the “->”, and an Ident can only be one letter (“x”, “y”, or “z”), not two.

4.

$X ::= L$

$X ::= X A$

$X ::= \text{Ident} \text{ “->” } X$

$A ::= \text{“ ( ” } X \text{ “ ) ”}$

$A ::= \text{Ident}$

$\text{Ident} ::= \text{“x”} \mid \text{“y”} \mid \text{“z”}$

Part 2:

5.

ab, aab, abab

6.

bb is in both languages, aaa is in  $(a \mid b)^+$  but not in  $(a^*b)^+$  because all strings in  $(a^*b)^+$  have to end in b (a can occur 0 or more times but b must occur at the end of each string).