Principles of Programming Languages – Tutorial 10(A)

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Acknowledgement: questions in this review are based on material by Diane Horton

Today

- **Review: Grammars & BNF**

Review: Grammars & BNF

Write a context-free grammar for the following language: All strings of 0s and 1s that are palindromes, i.e., are the same whether read forward or backwards.

Review: Grammars & BNF

Write a context-free grammar for the following language: All strings of 0s and 1s that are palindromes, i.e., are the same whether read forward or backwards.

```
<pal> ::= 0 <pal> 0 | 1 <pal> 1 | 0 | 1 | <empty>
```

Review: Grammars & BNF

Describe in English the language that is generated by the following BNF grammar.

```
<statement>  -->  B <statement>  |  Z <plunger>
<plunger>    -->  Z <plunger>  |  F <pretzel>
<pretzel>    -->  S <pretzel>  |  S
```

Review: Grammars & BNF

Describe in English the language that is generated by the following BNF grammar.

```
<statement>  -->  B <statement>  |  Z <plunger>
<plunger>    -->  Z <plunger>  |  F <pretzel>
<pretzel>    -->  S <pretzel>  |  S
```

All strings containing 0 or more B's, followed by 1 or more Z's, then one F, and one or more S's.

Review: Grammars & BNF

Prove that this grammar is ambiguous:

```
<S> --> <S><S> | 0 | 1
```

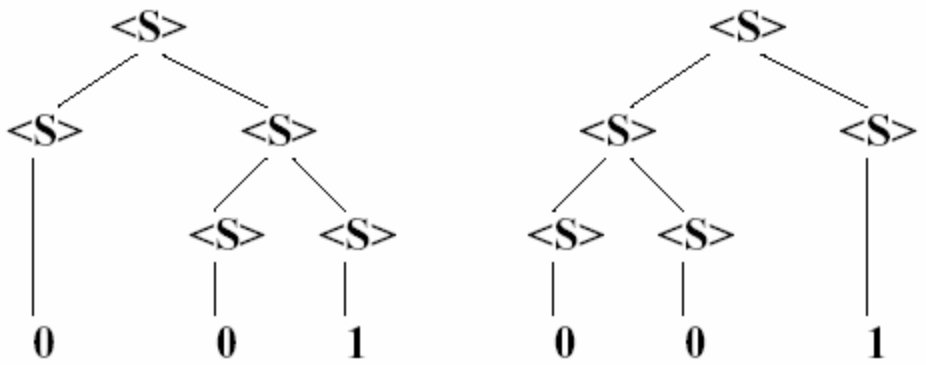
Transform the grammar from question (c) into a grammar that is unambiguous

Review: Grammars & BNF

Prove that this grammar is ambiguous:

<S> --> <S><S> | 0 | 1

The string "001" has two parse trees according to the grammar:



Therefore the grammar is ambiguous.

Transform the grammar from question (c) into a grammar that is unambiguous

<T> --> 0<T> | 1<T> | 0 | 1

Review: Grammars & BNF

Consider the following BNF grammar:

```
<pop>  --> + <bop> , <pop> = | <bop>
<bop>  --> <boop> | (<pop>)
<boop> --> x|y|z
```

Which of the strings below is a <pop>? Circle yes or no as appropriate.

Do not guess; correct answers are worth 1 mark and incorrect answers are worth -1 mark.

	Is it a <pop>?	
z	Yes	No
(x)	Yes	No
+y=	Yes	No
(+y=)	Yes	No
+(x),y=	Yes	No
+(x),+y,x==	Yes	No

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	Is it a <pop>?	
z	[Yes]	No
(x)	[Yes]	No
+y=	Yes	[No]
(+y=)	Yes	[No]
+(x),y=	[Yes]	No
+(x),+y,x==	[Yes]	No