

Principles of Programming Languages [PLP-2014]

Mid-Term Exam - December 18,2014

Solutions to Exercise 6

The solution of the other exercises will be published in the next days.

6)

- a) What is an ambiguous grammar? Write down a precise or formal definition.
- b) Using the definition of ambiguity just given, show that the following grammar is ambiguous:

$$\begin{aligned} S &\rightarrow aS \mid A \\ A &\rightarrow aAS \mid b \end{aligned}$$

Solution

- a) A grammar is ambiguous if there exists a word in its language that has two different parse trees.
 - b) The grammar is indeed ambiguous, as string **aababb** has two parse tree. Here are the corresponding left-most derivations:
 - a. $S \rightarrow aS \rightarrow aA \rightarrow aaAS \rightarrow aabS \rightarrow aabA \rightarrow aabaAS \rightarrow aababS \rightarrow aababA \rightarrow aababb$
 - b. $S \rightarrow A \rightarrow aAS \rightarrow aaASS \rightarrow aabSS \rightarrow aabaSS \rightarrow aabaAS \rightarrow aababS \rightarrow aababA \rightarrow aababb$
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