

Homework 4

Problem 2

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Let us provide 2 different constructions for the string from the grammar G :

`if condition then if condition $a := 1$ else $a := 1$`

Construction 1:

$\langle \text{STMT} \rangle \rightsquigarrow_G \langle \text{IF-THEN} \rangle \rightsquigarrow_G \text{if condition then } \langle \text{STMT} \rangle$
 $\rightsquigarrow_G \text{if condition then } \langle \text{IF-THEN-ELSE} \rangle$
 $\rightsquigarrow_G \text{if condition then if condition then } \langle \text{STMT} \rangle \text{ else } \langle \text{STMT} \rangle$
 $\rightsquigarrow_G \text{if condition then if condition then } \langle \text{ASSIGN} \rangle \text{ else } \langle \text{ASSIGN} \rangle$
 $\rightsquigarrow_G \text{if condition then if condition then } a:=1 \text{ else } a:=1$

Construction 2:

$\langle \text{STMT} \rangle \rightsquigarrow_G \langle \text{IF-THEN-ELSE} \rangle \rightsquigarrow_G \text{if condition then } \langle \text{STMT} \rangle \text{ else } \langle \text{STMT} \rangle$
 $\rightsquigarrow_G \text{if condition then } \langle \text{IF-THEN} \rangle \text{ else } \langle \text{ASSIGN} \rangle$
 $\rightsquigarrow_G \text{if condition then if condition then } \langle \text{STMT} \rangle \text{ else } a:=1$
 $\rightsquigarrow_G \text{if condition then if condition then } \langle \text{ASSIGN} \rangle \text{ else } a:=1$
 $\rightsquigarrow_G \text{if condition then if condition then } a:=1 \text{ else } a:=1$

Since a string in the grammar can be constructed in two different ways, the grammar is said to be ambiguous.