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CSCI 400 A

2/28/2013

Homework #5

Problem 2

**Original Grammar:**  
 <stmt> 🡪 if <expr> then <stmt>

🡪 if <expr> then <stmt> else <stmt>

1. **Original Statement:**

if Expr1 then if Expr2 then Stmt1 else Stmt2

**Leftmost Derivation 1:**

<stmt> 🡪 if <expr> then <stmt>

🡪 if Expr1 then <stmt>

🡪 if Expr1 then if <expr> then <stmt> else <stmt>

🡪 if Expr1 then if Expr2 then <stmt> else <stmt>

🡪 if Expr1 then if Expr2 then Stmt1 else <stmt>

🡪 **if Expr1 then if Expr2 then Stmt1 else Stmt2**

**Parse Tree 1:**

<stmt>

if <expr> then <stmt>

Expr1 if <expr> then <stmt> else <stmt>

Expr2 Stmt1 Stmt2

**Leftmost Derivation 2:**

<stmt> 🡪 if <expr> then <stmt> else <stmt>

🡪 if Expr1 then <stmt> else <stmt>

🡪 if Expr1 then if <expr> then <stmt> else <stmt>

🡪 if Expr1 then if Expr2 then <stmt> else <stmt>

🡪 if Expr1 then if Expr2 then Stmt1 else <stmt>

🡪 **if Expr1 then if Expr2 then Stmt1 else Stmt2**

**Parse Tree 2:**

<stmt>

if <expr> then <stmt> else <stmt>

Expr1 if <expr> then <stmt> Stmt2

Expr2 Stmt1

1. **Modified Grammar:**

<stmt> 🡪 <closed>

🡪 <open>

<closed> 🡪 if <expr> then <closed> else <closed>

<open> 🡪 if <expr> then <stmt>

🡪 if <expr> then <closed> else <open>

**Leftmost Derivation:**

<stmt> 🡪 <open>

🡪 if <expr> then <stmt>

* if Expr1 then <stmt>

🡪 if Expr1 then <closed>

🡪 if Expr1 then if <expr> then <closed> else <closed>

🡪 if Expr1 then if Expr2 then <closed> else <closed>

🡪 if Expr1 then if Expr2 then Stmt1 else <closed>

🡪 **if Expr1 then if Expr2 then Stmt1 else Stmt2**

**Parse Tree 2:**

<stmt>

<open>

if <expr> then <stmt>

Expr1 <closed>

if <expr> then <closed> else <closed>

Expr2 Stmt1 Stmt2