南方科技大学
SOUTHERN UNIVERSITY OF SCIENCE AND TECHNOLOGY

COMPILIER @Liu Yepang 2019

for SUSTech CSE

HomeWork 4

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1 Exercise 1: For the SDD in Figure 1, give annotated parse trees for the following expressions:

图 1: Syntax-directed definition of a simple desk calculator

	PRODUCTION	SEMANTIC RULES
1)	$L \to E$ **n**	$L.val = E.val$
2)	$E \to E_1 + T$	$E.val = E_1.val + T.val$
3)	$E \to T$	$E.val = T.val$
4)	$T \to T_1 * F$	$T.val = T_1.val \times F.val$
5)	$T \to F$	$T.val = F.val$
6)	$F \to (E)$	$F.val = E.val$
7)	$F \to$ **digit**	$F.val =$ **digit**.lexval

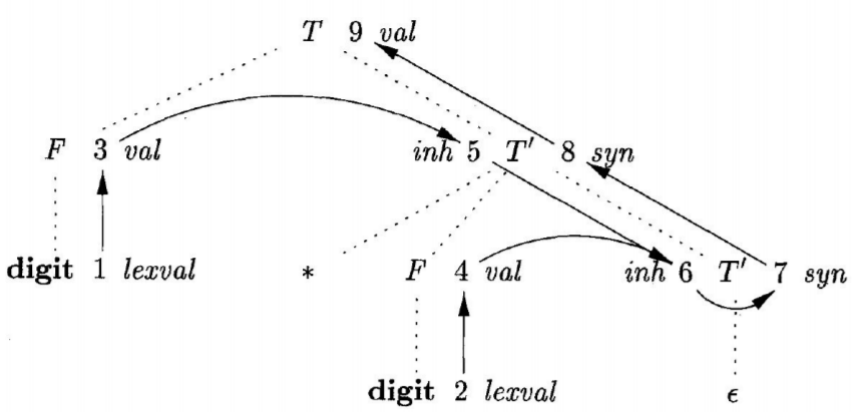
1.1 (3 + 4) ∗ (5 + 6)n [20 points]

1.2 1 ∗ 2 ∗ 3 ∗ (4 + 5)n [20 points]

1.3 (9 + 8 ∗ (7 + 6) + 5) ∗ 4n [20 points]

2 Exercise 2: What are all the topological sorts for the dependency graph of Figure 2? One sort mentioned during lecture is 1, 2, 3, . . . , 9 (slide #16 of Chapter 4). [20 points]

图 2: A dependency graph



The sequence must end with 6,7,8,9 and it can start with 1 or 2. So all the topological sorts of the dependency graph is:

- 2,4,1,3,5,6,7,8,9
- 2,1,4,3,5,6,7,8,9
- 2,1,3,4,5,6,7,8,9
- 2,1,3,5,4,6,7,8,9
- 1,2,4,3,5,6,7,8,9
- 1,2,3,4,5,6,7,8,9
- 1,2,3,5,4,6,7,8,9
- 1,3,2,4,5,6,7,8,9
- 1,3,2,5,4,6,7,8,9
- 1,3,5,2,4,6,7,8,9

3 Exercise 3: Below is a grammar for expressions involving operator + and integer or floatingpoint operands. Floating-point numbers are distinguished by having a decimal point. Give an SDD to determine the type of each term T and expression E. [20 points]

$$E \to E + T | T$$

$$T \to \text{num} \cdot \text{num} \,|\, \text{num}$$