Faculteit der Exacte Wetenschappen	Tentamen Compilerbouw
Vrije Universiteit	03-05-2000

Questions can be answered in Dutch or English.

1. Explain the following terms:

a. symbol table

b. tree automaton

c. arithmetic simplification

2. Give a brief description of the row-displacement table compression technique.

3. **a.** Describe the syntax error recovery of LLgen.

b. Show that it will always terminate.

4. Consider the grammar G:

$S_0 \rightarrow S\ \#$

$S \rightarrow a\ S\ b \mid a \mid \varepsilon$

where S_0 is the start symbol.

a. Argue that G cannot be LR(0), without constructing the LR(0) automaton.

b. Construct the LR(0) automaton; where is the conflict?

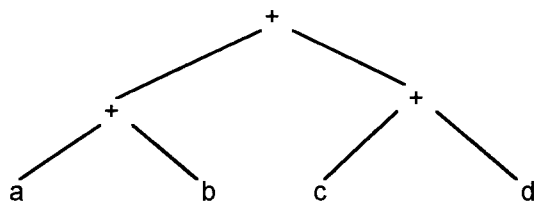
c. Construct the SLR(1) automaton; is it conflict-free?

5. Given a machine with only two instructions:

$R_n := R_n + R_m$

$R_n :=$ variable

How many registers are needed for the translation of the tree (without restructuring the tree)



in which a, b, c, d are variables? Show the calculations for obtaining the result.

6. **a.** Explain briefly how garbage collection by 'reference counting' works.

b. What serious problem does this method have?

7. What is a ladder sequence in code generation and why is it useful?

8. In code generation for object-oriented languages, methods are basically translated as routines.

a. How can the code for a method application find the proper routine to call, in the presence of dynamic binding?

b. How can the called routine find the data of the object it should work on?

9. In the Prolog rule

grandparent (X, Z) :– parent (X, Y), parent (Y, Z).

the goal 'parent (X, Y)' may match more than one Y. How are these multiple values transferred to the second goal 'parent (Y, Z)' ?

Assessment:

	1:	2:	3:	4:	5:	6:	7:	8:	9:	
a:	3	8	7	5	8	6	7	5	8	
b:	3		5	7		3		5		
c:	3			7						
	9	8	12	19	8	9	7	10	8	Total : 90