Questions can be answered in Dutch or English.

1. Explain the following terms briefly:

a. symbol table

b. dispatch table

c. S-attributed grammar

d. push-down automaton

2. A lexical analyser is constructed to recognise two patterns a and a*b. It is given the input aaa$ in which $ signals the end of the input.

The lexical analyser will have to read to the end of the input to see that the input does not match the pattern a*b. How can it still yield the first a of the input as the first recognised token?

3. An example of an *LR*(0) item is:

$$[A \rightarrow Bc \cdot De]$$

a. Describe the meaning of the components.
b. What additional information is kept in an *LR*(1) item ?

4. Given the transition table

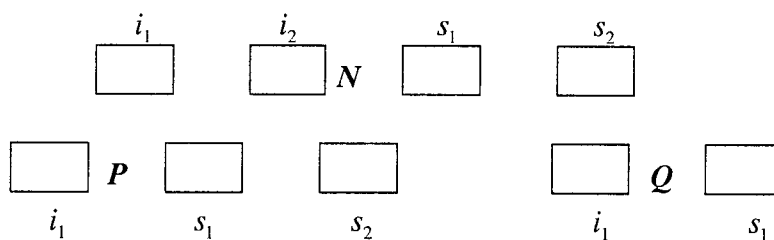|	0	1	2	3	4	5
A	A					B
B	A					B
C	C				D	
D		E		F		
E			A			
F			B			

a. Show how this matrix is compressed by the row displacement method.
b. How is element [C, 4] accessed ?
c. How is the empty element at [B, 4] accessed ?
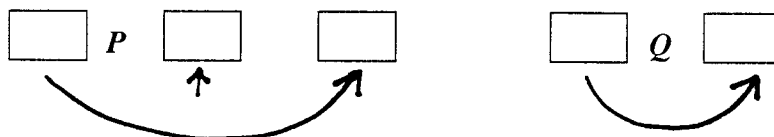
Z.O.Z.

5. Consider the attribute grammar rule

$$N(i_1, i_2, s_1, s_2) \rightarrow P(i_1, s_1, s_2) \quad Q(i_1, s_1)$$

{

$\quad N \cdot s_1 := P \cdot s_1 \quad ;$

$\quad N \cdot s_2 := P \cdot s_2 \quad ;$

$\quad P \cdot i_1 := N \cdot i_1 + Q \cdot s_1 \quad ;$

$\quad Q \cdot i_1 := N \cdot i_2$

}

a. Draw the dependency graph for N, in the following shape:

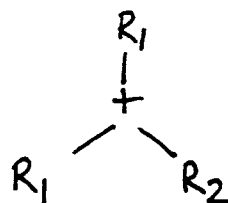**b.** Given the IS-graphs for P and Q,

and given that the IS-graph of N is still empty, show how the new update of the IS-graph of N is constructed.
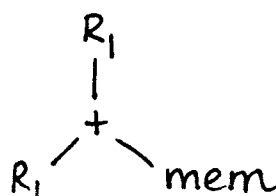
6. Given a machine with 3 machine instructions:

(1) $\qquad R_1 := \text{mem}$
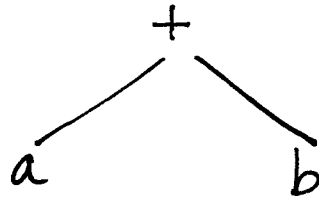

(2) $\qquad R_1 := R_1 + R_2$

(3) $\qquad R_1 := R_1 + \text{mem}$

where <u>mem</u> denotes the contents of a memory location, and given the input tree

to a bottom-up tree-rewriting code generator (BURS code generator).

a. Show the sets the BURS code generator builds at the nodes of the imput tree, and explain why is does so.

b. Show the tree or trees that result from the rewriting process.

7. Given the two-dimensional array

a [-2:2, -4:4]

then the simplest way to calculate the address of element a[i, j] is to calculate the starting address of the i-th row and then find its j-th element. There is, however, a more efficient way. Which?

8. Explain reference-count garbage collection, and discuss advantages and disadvantages.

9. Pointers to objects in a parallel object oriented language are implemented as pairs of machine addresses and location addresses. When objects are allowed to migrate, this no longer works. Suggest a solution.

Assessment:

1a : 3	2 : 8	3a : 6	4a : 8	5a : 4	6a : 7	7 : 6	8 : 9	9 : 7 :
b : 3		b : 5	b : 3	b : 7	b : 5			
c : 3			c : 3					
d : 3								
12	8	11	14	11	12	6	9	7