Faculteit der Exacte Wetenschappen	Tentamen Compilerbouw
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Questions can be answered in Dutch or English.

1. Explain the following terms:

a. symbol table

b. dispatch table

c. closure algorithm

d. register allocation

2. a) What is the dot motion rule for a lexical item of the form

$$[T \rightarrow \alpha \cdot (R)^* \beta]$$

b) Explain this rule.

3. Construct the $LR(0)$ automaton for the grammar

$$S: \; x\,S\,x \mid x \; .$$

3. Consider the attribute grammar

$$S \rightarrow A(i, s) \quad [i := s]$$

$$A(i_1, s_1) \rightarrow A(i_2, s_2) \quad a \quad [i_2 := i_1 ; \; s_1 := s_2]$$

$$A(i_1, s_1) \rightarrow B(i_2, s_2) \quad [i_2 := i_1 ; \; s_1 := s_2]$$

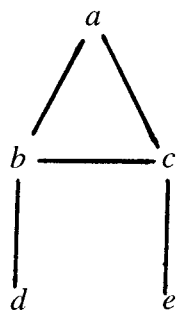
$$B(i, s) \rightarrow b \qquad [s := i]$$

in which the $\underline{i}$ s are inherited attributes and the $\underline{s}$ s are synthesized attributes. The attribute evaluation rules are given between square brackets.

Show by constructing the IS/SI graph of A that the attribute grammar is circular (contains a cycle).

Z.O.Z.

5. Given the register interference graph for five variables a, b, c, d and e :



Show the steps in which the graph colouring algorithm colours this graph, and produce the resulting register allocation.

6. Describe the compaction phase of a compacting mark and scan garbage collector. More in particular, show how pointers in chunks pointing to other chunks are updated.

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 object-locating by pointer chasing in a distributed system that allows migration.

Assessment:

1a : 2	2a : 5	3 : 10	4 : 15	5 : 10	6 : 15	7 : 6	8 : 10	
b : 3	b : 7							
c : 4								
d : 3								
12	12	10	15	10	15	6	10	Total : 90