„Semantic Theory“ SS 05 Exercise 5 (19/05/2005)

http://www.coli.uni-saarland.de/courses/semantics-05/

1 Lambda terms and lambda structures

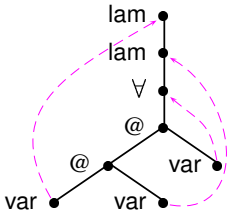
For each of the following lambda terms, give the corresponding lambda structure:

(a) $\forall z.\mathsf{dolphin}(z) \rightarrow (\mathsf{mammal}(z) \wedge \mathsf{live\_in\_sea}(z))$

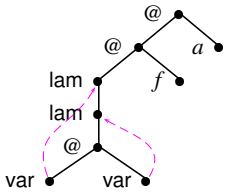
(b) $\lambda x.(f(\lambda x.x)(x))$

For each of the following lambda structures, give a corresponding lambda term:

(c)



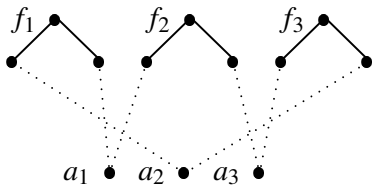
(d)



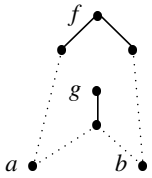
2 Solvability of dominance graphs

For each of the following dominance graphs, decide whether it is solvable or unsolvable. If it is solvable, give a lambda structure that solves it. If it is unsolvable, explain why you think it is unsolvable.

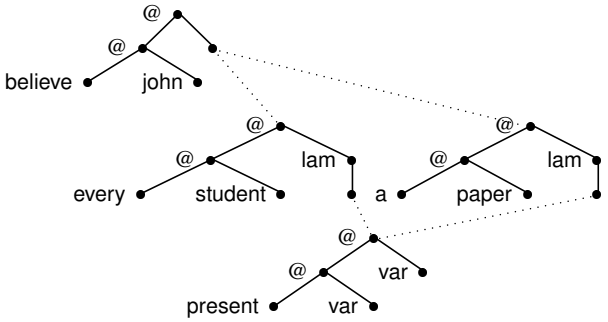
(a)



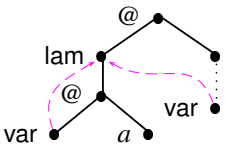
(b)



(c)



(d)



3 Semantics construction

Derive a dominance graph that describes the five readings of the following sentence:

> Every researcher of a company sees a sample.

The lexicon entry for the word "of" is the dominance graph with a single node which has the label of^*; of^* is a constant of type $\langle e, \langle e, t\rangle\rangle$. The semantic construction rules for the syntax rules PP $\rightarrow$ P NP and $\overline{\text{N}} \rightarrow$ N PP introduce applications, in the same way as the rules for sentences and verb phrases in the lecture.

Number the nodes in the syntax tree, and mark the interface node that belongs to each syntax node with its number.

4 Solving dominance graphs

Use the dominance graph solver described in the lecture to enumerate the five solved forms of the graph from Question 3. It is sufficient to give the dominance graphs that occur as arguments to recursive calls of the solver procedure; you don't have to spell out applications of Parent Normalisation and Redundancy Elimination. You may abbreviate the tree fragments (i.e. the subgraphs that are connected via tree edges) by triangles as in the lecture, but make sure that the tree fragments and their holes can still be identified.

5 * Solved forms and solutions

Prove that a dominance graph without binding edges has a solution if and only if it has a solved form.

To be turned in by 27/05/2005, 10:00 am