

# Quizzes for Computational Logic (320441) Fall 2014

Michael Kohlhase  
Jacobs University Bremen  
FOR COURSE PURPOSES ONLY

October 15, 2014

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## Quiz 1 (Tableau Completeness) Given Oct. 8. 2014

### Problem 1.1 (Soundness of First-Order Tableaux)

Briefly sketch the soundness argument for the first-order tableaux calculus. Make sure that you discuss the role of Skolemization. 4pt

### Problem 1.2 (Completeness of Free-Variable Tableaux)

Briefly sketch the completeness argument for the first-order tableaux calculus, taking the model existence theorem as a given. 8pt

Make sure that you discuss the effect of free variables, i.e. where we have to make a special argument due to their presence in the calculus.

## Quiz 2 ( $\lambda$ -terms and their parts) Given Oct. 15. 2014

**Problem 2.1** Consider the expression

12pt

$$\mathbf{A} := \lambda w.(\lambda F z.F zw)(\lambda x.y.x)$$

1. Is this a well-typed  $\lambda$ -term? If so, what is its type and what are the types of  $x$ ,  $y$ ,  $z$ ,  $w$ , and  $F$ ; briefly justify your type assignments; leave them open using generic type variables where possible.
2. What are the binder, matrix, and syntactic head of  $\mathbf{A}$ ?
3. Give the head reduction sequence of  $\mathbf{A}$  to  $\beta$ -normal form (which we call  $\mathbf{N}$ ).
4. What are the binder, matrix, and syntactic head of  $\mathbf{N}$ ?
5. What is  $\text{head}(\mathbf{A})$ ?