You have **120** minutes to do this exam. Please number every sheet of paper that you submit, and note the total number of sheets on the first page. You may not use any additional materials beyond those we distribute together with this exam. Please do not use pencils!

You can achieve a total of (xxx) points in this exam. The grade is determined based on a total number of 100 points, so there are (xx) bonus points. In order to pass, you must get at least 50 points.

We accept answers in English and German; feel free to use whichever language you feel more comfortable with.

Good luck!

1 Type theory

Consider sentence (1) and its syntactic structure (2):

- (1) a. An unknown person robbed a bank.
 - b. $\left[\sum_{N \in \mathbb{N}} \left[\sum_{N \in \mathbb{N}} An \right] \right]_{N'} \left[Adj unknown \right] \left[\sum_{N \in \mathbb{N}} person \right] \left[\sum_{V \in \mathbb{N}} \left[\sum_{V \in \mathbb{N}} adj \right] \right]_{N} bank \right] \right]$
- 1. Give the appropriate types for the five words occuring in this sentence.
- Translate person, robbed, bank to person', rob', bank', respectively, and the indefinite article and unknown to appropriate lambda expressions, where the tranlation of the latter should use the constant know* of type (e, (e, t)).
- 3. Derive the semantic representation for the sentence, using basic composition rules and beta reduction. If you are not able to find a reasonable lambda term for unknown, you may use unknown' as translation for this part of the problem.
- 4. Specify the type and try to give a type-theoretic representation that expresses the semantic function of the adjectival prefix "un-", as in unknown, unclear (for the attributive use of the adjective). Note: Do not use event semantics, but just standard type-theoretic semantics, as we introduced it in the first part of the course.

2 Cooper storage

Consider the following sentence and its syntactic structure.

(2) a. Every student believes that a professor works.

b. $[_{S} [_{NP} \text{ Every student}] [_{VP} [_{V} \text{ believes}] [_{S'} \text{ that } [_{S} [_{NP} \text{ a professor}] [_{VP} \text{ works}]]]]]$

The sentence is scopally ambiguous: In total, it has three readings.

1. Compute one semantic representation for this sentence using the Nested Cooper Storage technique in which "a professor" takes scope over "believe."

Assume that *believe* translates into *believe'* of type $\langle t, \langle e, t \rangle \rangle$; the other expressions should be represented as usual.

2. Question (a) asks for *one* reading of the sentence. Please indicate how the other two readings can be derived by sketching at which level you apply which rule (storage, retrieval, or application).

3 Underspecification

- 1. Extend the semantics construction rules for dominance graphs from the lecture by rules for S \to V S' and S' \to that S.
- Compute a dominance graph for (2). You don't have to do this step by step - it is sufficient to give the final graph and indicate which interface node in the graph corresponds to which node in the syntax tree (e.g., by using indices).

4 DRS

Consider the following sentence:

- (3) If Pedro does'nt like a donkey, he doesn't beat it.
- 1. Give a DRS K₃ that represents the semantics of (3). It is not necessary to construct K₃ explicitly.
- 2. Compute the truth conditions of K_3 . Give a sufficient number of intermediate interpretation steps to make the structure of the interpretation process visible.

5 Presuppositions

Consider the following text:

(4) Peter knows a professor. He grades his PhD-thesis.

- 1. Give a proto-DRS K_4 for (4) that contains α -DRSs. It is not necessary to construct the proto-DRS explicitly.
- Show how a DRS that is a correct and plausible semantic representation of (4) can be derived from K₄ by application of van der Sandt's binding and accommodation rules.

6 Lexical semantics

- 1. The notion of a thematic role as such is highly useful. The problem is: How many different roles are there? Describe *briefly* the answers proposed by (1) Fillmore's original theory of thematic roles, (2) by PropBank, and (3) by FrameNet, and point out advantages and disadvantages.
- In FrameNet, the verb "eat" evokes the frame "Ingestion," and comes with Frame Elements/Roles "Ingestor" and "Ingestible." Give an eventsemantic representation of "eat" in the "Neo-Davidsonian" version, i.e., with roles represented by 2-place relations.
- 3. Transfer the frame-semantic information to description logic, by giving axioms that express the relation between Eating, Ingestion, and the relations of Ingestor and Ingestible, and encode the information that the Ingestor is an Animate entity and the Ingestible is a Physical_Object.