Home Assignment 4

1. Which of the following feature structures subsumes the other?

\[ A = [f: \begin{array}{c} 3 \\ [f: 3] \end{array}], \quad B = [f: \begin{array}{c} 2 \\ [f: 2] \end{array}] \]

2. Let:

\[ A = [f: a] \]
\[ B = [g: [f: a]] \]
\[ C = [f: a] \begin{array}{c} [f: a] \end{array} \]
\[ D = \begin{array}{c} [f: a] \\ g: [f: a] \end{array} \]
\[ E = [f: [f: a]] \begin{array}{c} [f: a] \end{array} \]
\[ F = [f: \begin{array}{c} 1 \\ g: [f: 1] \end{array}] \]

Which of the following holds?

(a) \( A \cup B = C \)
(b) \( A \cup C = D \)
(c) \( A \cup F = C \)
(d) \( A \cup F = E \)
(e) \( B \cup F = E \)
(f) \( C \cup D = D \)
(g) \( C \cup D = E \)
(h) \( D \cup D = E \)
(i) \( E \cup F = E \)

3. Following is a CFG generating Hebrew noun phrases. Augment it with feature structures to enforce agreement on definiteness between the noun and the adjectives:

- kaddur gadol hitgalgel
- ha-kaddur ha-gadol hitgalgel
* kaddur ha-gadol hitgalgel
* ha-kaddur gadol hitgalgel

\[
NP \to NP ADJP \\
NP \to N | D N \\
ADJP \to ADJ | D ADJ \\
N \to kaddur | tapuax \\
ADJ \to gadol | 'adom \\
D \to ha-
\]

4. Extend \( G_2 \), the unification grammar for \( E_0 \), such that transitive verbs with a sentential object are accounted for, too. The grammar must generate also the following sentences:
Rachel thinks that the sheep sleep
Rachel knows that Jacob loves her
Laban knows that Rachel thinks that Jacob loves her

5. Design a unification grammar for the (formal) language \( L = \{a^n b^m c^n d^m \mid 0 \leq m, n \} \).

Submission is individual. Answers should be fully argued.

Submission date: 15.6.02

Good Luck!