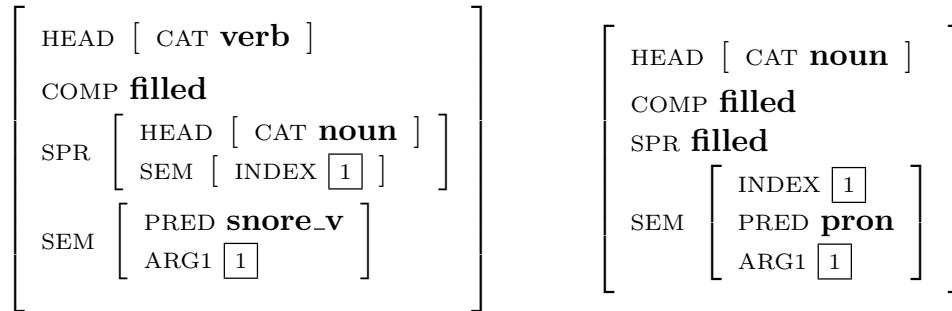


# 2005 Paper 13 Question 11

## Natural Language Processing

- (a) The Figure below shows feature structures corresponding to lexical entries for *snores* and *he*.



These structures can be combined using a grammar rule to give a feature structure corresponding to the phrase *he snores* with a semantic structure equivalent to  $\text{pron}(x) \wedge \text{snore\_v}(x)$ . Give this grammar rule as a feature structure and show the results of applying the rule to the structures in the Figure. [7 marks]

- (b) Syntactically the verb *rains* takes the pleonastic pronoun *it* as subject but semantically it has no arguments. Give possible feature structures for *rains* and pleonastic *it*. Show how ungrammatical sentences such as *he rains* are avoided, mentioning any modifications to the lexical entries in the Figure that might be necessary. [6 marks]

- (c) Selectional restrictions can be used to block parses of semantically anomalous sentences such as:

The pebble snores.  
 The pebble wrote a book.  
 The dog wrote a book.

Describe how selectional restrictions might be encoded in a feature structure grammar. [7 marks]