Natural Language Processing

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

```
[HEAD [CAT verb ] ]
[COMP filled ]
[SPR [HEAD [CAT noun ] ] ]
[SEM [PRED snore_v ] ]
[ARG1 [1 ] ]
```

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 pron(x) ⋀ 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