2010 Paper 8 Question 10

Natural Language Processing

The following shows a simple context-free grammar:

```
S -> NP VP     N -> N PP     Det -> the
PP -> P NP     N -> cat      P -> in
NP -> Det N    N -> box      VP -> snored
N -> Adj N     Adj -> big
```

(*a*) Describe the concept of a *chart* as used in natural language parsing.   [7 marks]

(*b*) Assuming that the sample grammar is applied by a bottom-up passive parsing algorithm without packing, show the chart that would be produced from a complete analysis of the following sentence:

<div align="center">the big cat in the box snored</div>

[8 marks]

(*c*) What is packing and what is its effect on the computational complexity of parsing with a context-free grammar?   [3 marks]

(*d*) Show what the differences would be between the packed chart and the chart you gave in answer to part (*b*).   [2 marks].