1999 Paper 13 Question 7

Compiler Construction

It is desired to obtain an unambiguous context-free grammar G' which generates the same strings as the following grammar G with start symbol S.

```
S -> E
E -> ( E ) | [ E ] | E * E | a | b | c
( E ) -> ( + E )
[ E ] -> [ - E ]
```

Define a suitable G' or explain why G already satisfies the criterion.   [6 marks]

Write a context-free (Type 2) grammar which describes floating-point numbers of the form $[\pm]dd^*[.d^*][e[\pm]dd^*]$ where d stands for decimal digit and d^* stands for zero or more decimal digits. $[\cdots]$ means that the enclosed item is optionally present in the floating-point number.   [7 marks]

Sketch a recursive descent parser for the following grammar H with start symbol S. You should assume the existence of a routine `lex()` which sets variable `token` to one of '1', '2', '(', ')', '-' or `eof`.

```
P -> 1 | 2 | (E)
E -> P | E - P
S -> E eof
```

[7 marks]