Homework, the 1st series

Deadline: 6 April, 2014, 23:59

A correctly parenthesized expression is generated by the grammar $A \rightarrow AA \,|\, (A) \,|\, \varepsilon$.
A correctly 2-parenthesized expression is generated by the grammar
$A \rightarrow AA \,|\, (A) \,|\, [A] \,|\, \varepsilon$.

(a) Show that the set of words over alphabet $(,), X$, which can be turned into a correctly parenthesized expression by some replacement of symbols X by parentheses, is in the complexity class L.

(b) Show that the set of words over alphabet $(,), [,], X$, which can be turned into a correctly 2-patenthesized expression by some replacement of symbols X by parentheses (of any type), is in the complexity class P.

For example, the word $[()X)X(X$ is in the language because of, e.g., the replacement $[()()]()$, but the word $[((X]X$, is not.