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-parenthesized 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 $[()0]00$, but the word $[(X)X$, is not.