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for SUSTech CSE

HomeWork 3

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1 Exercise 1 (Top-Down Parsing):

Consider the following grammar G:

$$S \to aB$$
$$B \to S + B|\epsilon$$

1.1 Construct the predictive parsing table for G. [20 points]

$$FIRST(S) : \{a\}$$
$$FIRST(B) : \{a, \epsilon\}$$
$$FELLOW(S)\{+, \$\}$$
$$FELLOW(B)\{+, \$\}$$

表 1: Parsing Table

Non-Terminal	INPUT SYMBOL		
	a	+	$
S	$S \to aB$		
B	$B \to S + B$	$B \to \epsilon$	$B \to \epsilon$

1.2 Is the grammar LL(1)? [10 points]

For the $B \to S + B|\epsilon$

- $FIRST(S + B) = \{a\}$ and $FIRST(\epsilon) = \{\epsilon\}$, $FIRST(S + B) \bigcup FIRST(\epsilon) = \emptyset$
- $FIRST(\epsilon) = \{\epsilon\}$, and $FIRST(S + B) \bigcup FELLOW(B) = \emptyset$

So $B \to S + B|\epsilon$ is LL(1)

1.3 Can an LL(1) parser accept the input string aaaa+++? If yes, please list the moves made by the parser; otherwise, state the reason. Before parsing, please resolve conflicts in the parsing table if any. [20 points]