Exercise 1: SLR grammars

1. We define the following grammar :

\[ S \rightarrow E \]  \hspace{1cm} (1)
\[ E \rightarrow E + E \]  \hspace{1cm} (2)
\[ E \rightarrow \text{int} \]  \hspace{1cm} (3)

where \( S \) is the axiom.

(a) Give two distinct derivations of \( \text{int} + \text{int} + \text{int} \).

(b) Compute \( \text{Follow}_1(E) \) and \( \text{Follow}_1(S) \).

(c) Show that this grammar is not SLR, i.e. give an accessible state \( q \) and a lookup \( u \) such that \( |\text{action}(q, u)| > 1 \).

2. We define the following grammar :

\[ S \rightarrow PT \]  \hspace{1cm} (4)
\[ T \rightarrow \varepsilon \]  \hspace{1cm} (5)
\[ T \rightarrow +PT \]  \hspace{1cm} (6)
\[ P \rightarrow (S) \]  \hspace{1cm} (7)
\[ P \rightarrow \text{int} \]  \hspace{1cm} (8)

where \( S \) is the axiom.

(a) Give a derivation of \( (\text{int} + \text{int}) + \text{int} \).

(b) Compute \( \text{Follow}_1(S) \), \( \text{Follow}_1(T) \), and \( \text{Follow}_1(P) \).

(c) Show that this grammar is SLR, i.e. give a table for \textit{action} and \textit{goto}. 
