3. Presence Exercise Sheet for the Lecture
Computer Science Theory

Exercise 1: Pushdown automata
Consider the following PDA \( A \) over \( \Sigma = \{a, b\} \).

\[
\begin{align*}
(Z_0, a, AZ_0), & \quad (A, a, AA) & \quad (A, a, \varepsilon) \\
(A, b, A) & \quad (Z_0, b, Z_0) & \quad (Z_0, \varepsilon, Z_0)
\end{align*}
\]

(a) What is \( L(A) \), i.e., the language accepted by \( A \) with final states?

*Hint*: Decompose the problem:

- What happens in \( q_0 \) (\( q_1 \), \( q_2 \))? 
- When can we go from \( q_0 \) to \( q_1 \) (from \( q_1 \) to \( q_2 \))? 

(b) Construct a PDA which accepts the same language, but with the empty stack.