Formal Languages and Compilers Theory test July 03, 2023

1. (9 points) Find a regular expression that represents the complement of the language represented by the following regular expression:
   $(1(0|1)^*)^*$

2. (8 points) Find a PDA that accepts the language of all the strings taking the form $a^n b^k a^m$ with n>0, k>0, m>0, and n+m=k.

3. (9 points) Build the SLR parsing table for the following grammar whose set of terminal symbols is { x , *, < , > } and whose start symbol is S

   $S \rightarrow A \mid A * S \mid \varepsilon$
   $A \rightarrow < B >$
   $B \rightarrow x \mid x * B$

   Tell if this grammar is SLR or not. Motivate your answer.

4. (6 points) What is the difference, in terms of computational complexity, between the membership problem for context-free languages and the membership problem for deterministic context-free languages?