You need only hand in the questions marked with a star * as part of your assignment. All questions can appear on quizzes.

*1. (hand-in)
   a. Construct a finite automata equivalent to the regular expression
      \[ 1[(01)^* + 1 + 01)^* + 1]^*0 \]
   b. Construct a regular expression that represents the language accepted by the following automata:


*2. (hand-in) Prove that each of the following three languages is not regular.
   a. \( \{a^n b^n c^n \mid n \geq 0\} \)
   b. The set of palindromes over the alphabet \( \{0, 1\} \).
   c. \( \{0^110^210^31\cdots0^{n-1}10^n1 \mid n \geq 1\} \).

3. Let \( N \) be a NFA with \( k \) states that accepts some language \( A \). If \( A \) is non-empty, show that \( A \) contains some string of length at most \( k \), and show that if \( \overline{A} \) is non-empty then \( \overline{A} \) contains a string of length at most \( 2^k \).