Challenge Activity 5 – Regular Languages

1. Consider the regular language L1 given by the regular expression: (01+10)(01+10)*
   a) Prove using the induction method that all the strings belonging to L1 have an even length;
   b) Knowing that L1 is a regular language, prove using the closure properties of regular languages that the language L2={w^n | w∈{a,b} and n ≥ 1} is a regular language;
2. Given as input two regular languages L3 and L4, represented using DFAs, NFAs, ε-NFAs, and/or regular expressions, describe how do you prove L3 ⊆ L4;
3. Comment the following sentence: "The language of the lexemes[1] existent in any Python program is a regular language."

[1] Consider as lexemes all the elements, i.e., keywords, reserved words, identifiers, literals, that form the input Python program.