Homework 9

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L is NOT a finite state language. The reason is that the class of regular languages is closed under the concatenation operation. We prove by contradiction.

Suppose L is an **FSL**. Consider the strings $w_1 = 1001$ and $w_2 = 1100$. Since they both contain a sequence of two adjacent 0's, they both have a run of two 0's. We have $w_1 \in L$ and $w_2 \in L$ because 00 is the only run of 0's in both w_1 and w_2.

However, the concatenation $w = w_1 \circ w_2 = 10011100$, which contains two 00, or two runs of 0 with length 2. So $w \notin L$.

Therefore, L is NOT a finite state language.