Exercise 2. Design deterministic finite state automata which accept each of the following languages. Implement and test your designs with JFLAP and provide explanations of each automaton.

a) $\{w \in \{a,b\}^* : \text{ every } a \text{ in } w \text{ is immediately preceded and followed by } b\}$.

b) $\{w \in \{a,b\}^* : \ w \text{ does not end in } ba\}$.

f) $\{w \in \{0,1\}^* : \ w \text{ has 001 as substring}\}$.

g) $\{w \in \{0,1\}^* : \ w \text{ does not have 001 as substring}\}$.

h) $\{w \in \{a,b\}^* : w \text{ has } bbab \text{ as substring}\}$.

j) $\{w \in \{a,b\}^* : w \text{ has both } aa \text{ and } bb \text{ as substrings}\}$.

l) $\{w \in \{0,1\}^* : w \text{ has no more than one pair of consecutive 0's and no more than one pair of consecutive 1's}\}$.

n) $\{w \in \{a,b\}^* : (\#_a(w) + 2 \cdot \#_b(w) \equiv_5 0)\}$. Note: $\#_a(w)$ represents the number of a's in w.

Solution.