1. Let $A = \{0, 1\}$ be an alphabet that consists of two binary digits. Denote by $f(x)$ the numerical equivalent of $x$, as we did in class. Design a dfa that accepts the set of words $\{x \in \{0, 1\}^* \mid f(x) \text{ is a multiple of } 6\}$.

2. Determine the languages accepted by the automata $M_0$ and $M_1$ shown in Figure 1.

3. Construct deterministic finite automata that accept the following languages over the alphabet $A = \{a, b, c\}$:

   (a) The set of all words that begin with $ab$ and end with $ba$.
   (b) The set $\{bab\}$.
   (c) The set $A^* - \{bab\}$.
4. Draw a transition diagram for a nondeterministic finite automaton $M$ that accepts the language $L$ over the alphabet $A = \{0, 1\}$ that begin in 10 and end in 00. Note that $100 \in L$.

Construct the dfa that accepts the same language as $M$.

5. Let $A$ be an alphabet and let $a \in A$ be a symbol. If $k$ is a natural number, construct a nondeterministic finite automaton that accepts the language $L_{k,a} = \{uav \mid u, v \in A^* \text{ and } |v| = k\}$. 