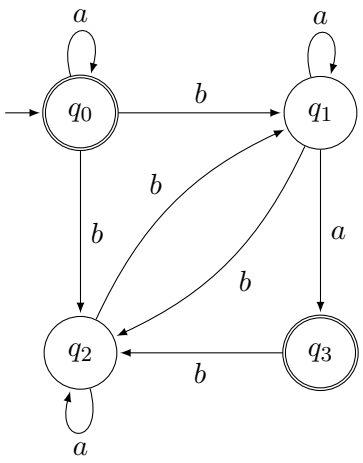
Exercise 5. Consider the following nondeterministic finite state machine M:



For each of the following strings w, determine whether $w \in L(M)$. Justify your answers.

a) $aabbba$

b) bab

c) $baba$

Solution.

Exercise 6. Design finite state automata (either deterministic or nondeterministic) which accept each of the following languages. Implement and test your designs with JFLAP and provide explanations.

a) $\{a^n b a^m : n, m \geq 0, n \equiv_3 m\}$.

b) $\{w \in \{a, b\}^* : \ w$ contains at least one instance of $aaba$, bbb, or $ababa\}$.

e) $\{w \in \{0, 1\}^* : \ w$ corresponds to the binary encoding of a positive integer that is divisible by 16 or is odd$\}$.

f) $\{w \in \{a, b, c, d, e\}^* : \ |w| \geq 2$ and w begins and ends with the same symbol$\}$.

Solution.

Exercise 8. Design a DFA which accepts each of the following languages. The point of this exercise is to see how much harder it is to build a DFA for tasks like these than it is to build an NFA. Do not simply build an NFA and convert it to a DFA. However, after designing a DFA, design an NFA which accepts the same language. Test both of your designs with JFLAP to uncover any possible flaws.

a) $\{w \in \{a, b\}^* : \$ the fourth from the last character is $a\}$.

Solution.