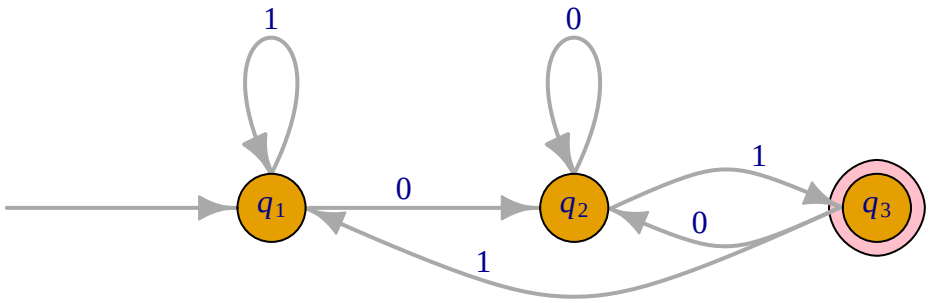
## Prework 1.1a: Finite Automata

Write up preliminary solutions to each problem. If you are having trouble making progress on a problem, record some relevant facts and definitions, and include any questions that you have. For written prework, everyone should do every problem. The names in brackets indicate who is responsible for presenting the problem; one of these students will be chosen to explain the problem in class.

1. [Benjamin, Grace, Levi] Modify the state diagram in Figure 1.8 (page 37) so that the language recognized by the automaton is $\{w \mid w \text{ ends in } 11\}$.

2. [Andrew, Ky, Todd] Refer to Definition 1.5. For the finite automaton with the following state diagram, identify $Q$, $\Sigma$, $\delta$, $q_0$, and $F$, and describe the language it recognizes.




3. [Meghan, Allie, Connor] Consider the finite automaton with $Q = \{q_1, q_2, q_3, q_4, q_5\}$, $\Sigma = \{\text{a}, \text{b}\}$, transition function $\delta$ given by the table below, initial state $q_3$, and $F = \{q_3\}$. Draw its state diagram, and describe the language it recognizes.

| | $q_1$ | $q_2$ | $q_3$ | $q_4$ | $q_5$ |
|---|---|---|---|---|---|
| a | $q_1$ | $q_1$ | $q_2$ | $q_3$ | $q_4$ |
| b | $q_2$ | $q_3$ | $q_4$ | $q_5$ | $q_5$ |

4. [Micah, Curtis, David] Let $\Sigma = \{0, 1\}$, and let $A$ be the set of all strings that end in 1 or have an even number of symbols (or both). Draw a state diagram for a finite automaton that recognizes $A$.

BEGIN YOUR SOLUTIONS BELOW THIS LINE