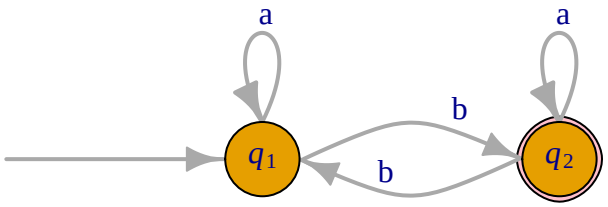
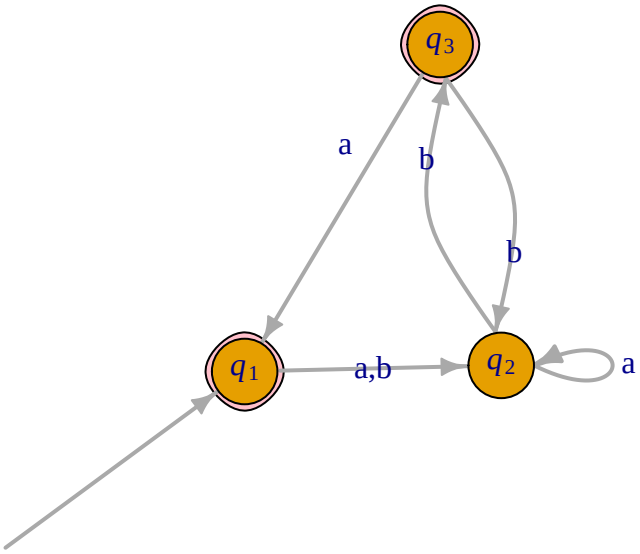
## Prework 1.3b: Converting DFA's to Regular Expressions

Write your preliminary solutions to each problem and submit a PDF on Canvas. The names in brackets indicate the subset responsible for presenting the problem.

1. [Allie, Todd, Levi] Use the method described in the proof of Lemma 1.60 to convert the following DFA into a regular expression. (First convert the DFA to a GNFA, then delete two states to obtain a GNFA with a single edge giving the regular expression.)




2. [Meghan, Curtis, Ben] Use the method described in the proof of Lemma 1.60 to convert the following DFA into a regular expression.




*For problems 3 and 4 we are using the notation $a^k$ to represent the string $\underbrace{aaa\cdots a}_{k}$.*

3. [Ky, Connor, Joshua] Let $A = \{0^n1^n \mid n \in \mathbb{N}\}$. Which of the following regular expressions describe the language $A$? For each expression, explain why the expression describes $A$, or why it doesn't.

$$0^*1^*, \quad 0^+1^+, \quad 0^*011^*, \quad (01)^*, \quad (01)^+$$

4. [Grace, David, Andrew, Micah] Suppose that $M$ is a DFA with 5 states that accepts the string 000000.
   a. Explain why, when $M$ processes 000000, some state must occur twice.
   b. Explain why $M$ must also accept infinitely many strings of the form $0^k$ for certain values of $k > 6$.

BEGIN YOUR SOLUTIONS BELOW THIS LINE