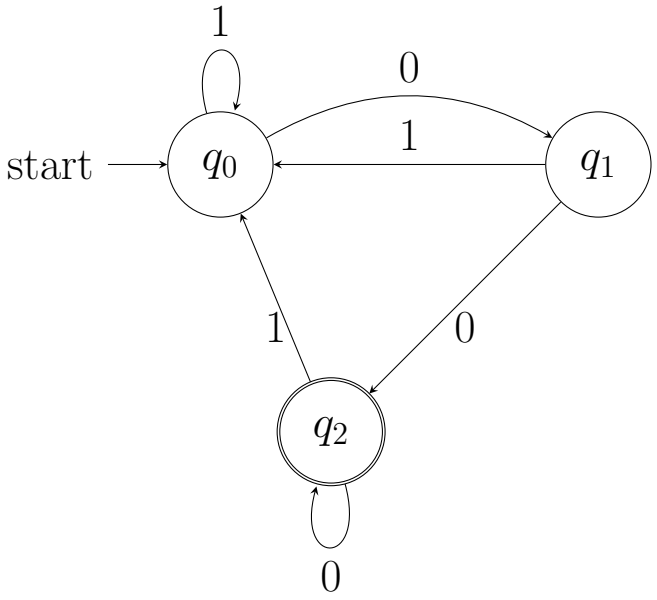
Due:Sept 19 at 11:59 pm

1. **Describing DFAs**

   For the following deterministic finite automaton $M_1$:

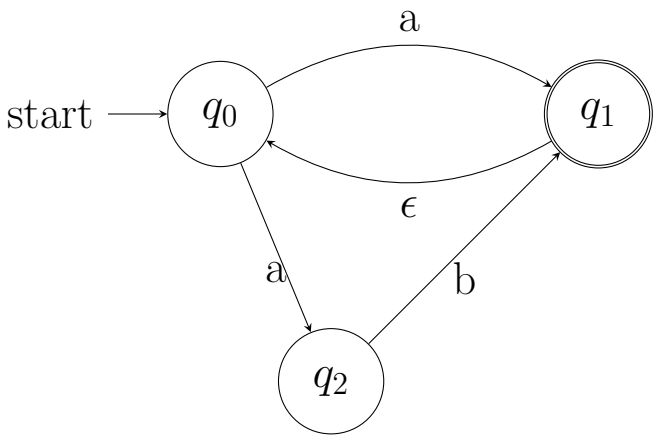
   - Determine what language $M_1$recognizes.




2. Draw an NFA whose alphabet is $\{a, b\}$ and which accepts the language of strings such that any two consecutive $a$s are followed by exactly 3 consecutive $b$s. Note that this does not require that 2 consecutive $a$s ever appear in the input, just that anytime you see $aa$, you must then see exactly 3 consecutive $b$s. The following are examples of strings in the language of this NFA:

```
(epsilon)
a
babaabbba
aabbbaabbbababababbbbb
```

3. **Describing NFAs** Give the formal definition $(Q, \Sigma, \delta, q_0, F)$ of the following NFA,and show that it accepts the string "aab" according to the formal definition of accepting.




4. **Subset Construction** Turn the above NFA into DFA using the subset construction. It should be clear from your drawing of a DFA how the subset construction was applied.

5. **Intersection** Prove that the set of regular languages is closed under the intersection operation, i.e., prove that if languages $A$ and $B$ are regular, then $A \cap B$ is also regular. You may assume that $A$ and $B$ share the same alphabet.