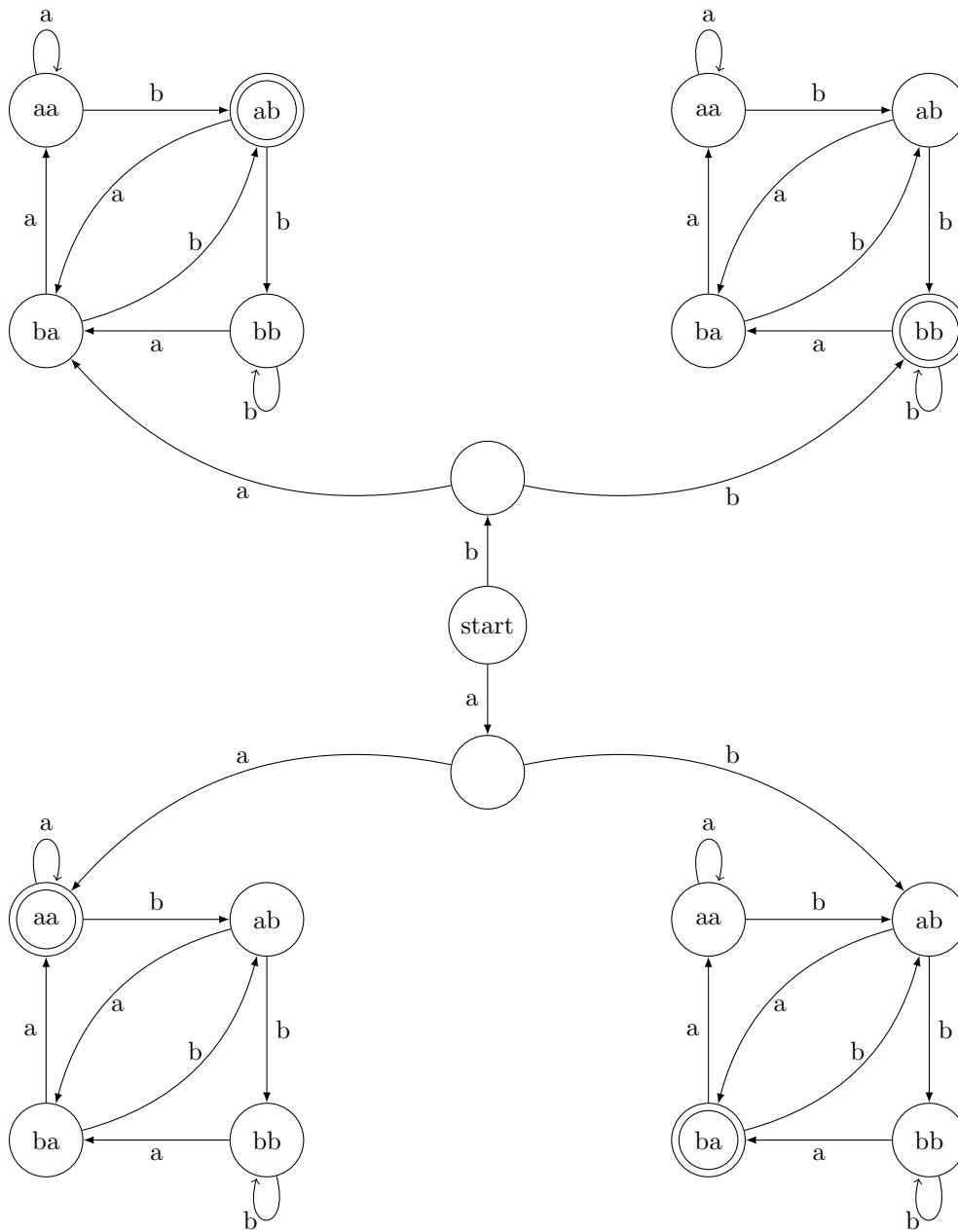


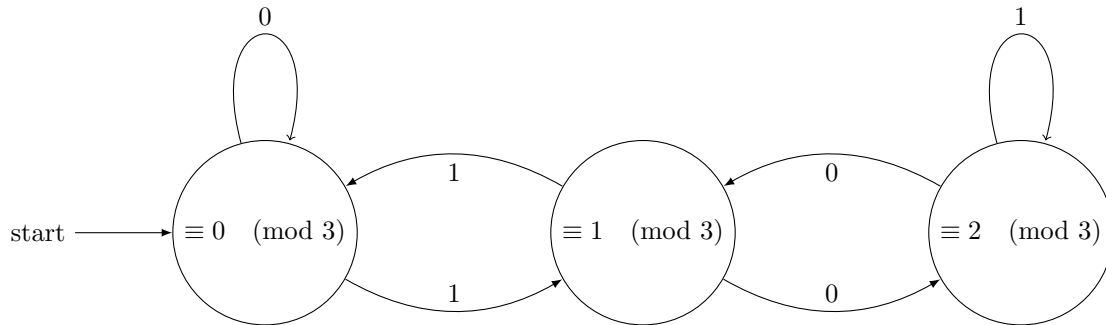
Problem 1 Solution



Problem 1 Rubric

- Any Correct Solution: 15/15
- Almost correct solution:
 - deduct 1 point per edge that needs to be fixed
- Not close to correct solution: 0/15.

Problem 2 Solution



Problem 2 Rubric

- Any Correct Solution: 25/25
- Almost correct solution:
 - deduct 5 points per edge that needs to be fixed
- Not close to correct solution: 0/25.

Problem 3 Part 1: Prefix Solution (20 points)

- Let (Q, δ, q_0, F) be the DFA that accepts L .
- Let G be the set of nodes that can reach some node in F . Formally, let $p(x, y)$ indicate that there is a path from node x to node y . Then, $G = \{x | \exists y \in F, p(x, y)\}$.
- The DFA $(Q, \delta, q_0, F \cup G)$ accepts $\text{prefix}(L)$.

Problem 3 Part 1: Prefix Rubric (20 points)

- Any correct solution: 20/20.
- Incorrect solution fixable by changing “make all states final states” to “make all states that can reach the final state a final state”: 15/20
- Completely wrong ideas: 0/20.

Problem 3 Part 2: Suffix Solution (20 points)

- Let (Q, δ, q_0, F) be the DFA that accepts L .
- Create a new NFA $(Q \cup \{q'_0\}, \delta', q'_0, F)$ as follows:
 - q'_0 is a new state
 - construct δ' by taking δ , then adding a ϵ transition from q'_0 to every state in Q

Problem 3 Part 2: Suffix Rubric (20 points)

- Any correct solution: 20/20.
- Incorrect solution that creates ϵ transitions from q_0 instead of q'_0 : 15/20
- Completely wrong ideas: 0/20.

Problem 3 Part 3: Mid Solution (20 points)

- Apply the Prefix process.
- Then apply the Suffix process.

Problem 3 Part 3: Mid Rubric (20 points)

- Any correct solution: 20/20.
- Completely wrong ideas: 0/20.