Program 1:

Description:

The acceptable strings of the language are ε (Null string), aa, bb, abba, babbab etc.

Deterministic Finite Automata for the given language is given below.

DFA $M = (Q, \Sigma, \delta, Q_0, F)$ where Q = set of all states

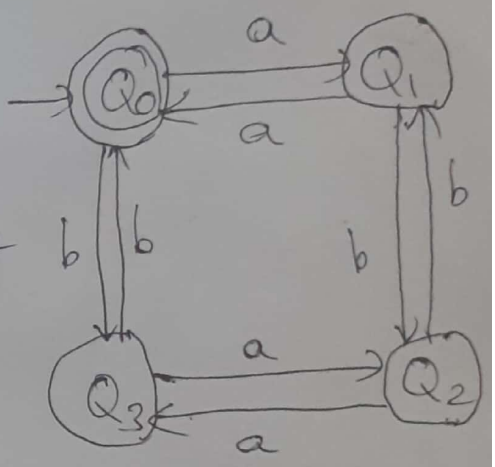
$= \{Q_0, Q_1, Q_2, Q_3\}$

Σ = input Alphabet = $\{a, b\}$

start state is Q_0.

F = set of all final states = $\{Q_0\}$

and the transitions are defined in the transition diagram



Test cases:

Input 1-aabb output - string accepted.

Input 2-abab output - string accepted

Input 3-aaabb output - string not accepted

Input 4-aaa output - string not accepted