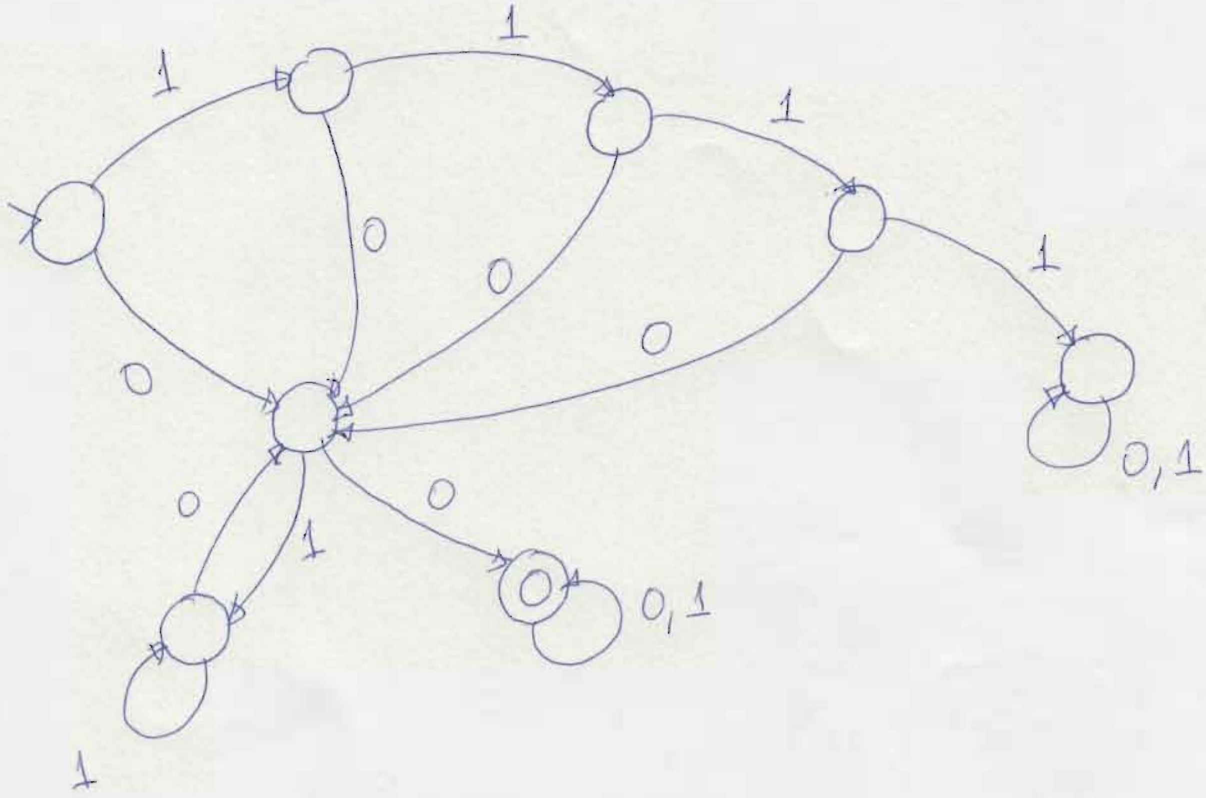
Q1.



Q2.

a) [0]: member strings

[01]: concatenatewith 001
10
11
00

[00]: concatenate with 0
1

[111]: concatenate with 0000
001
010
011
100
101
110
111

⋮

It's not a regular language $(L: (0 \cup 1)^{2n+1} \, 0 \, (0 \cup 1)^{2n+1}$

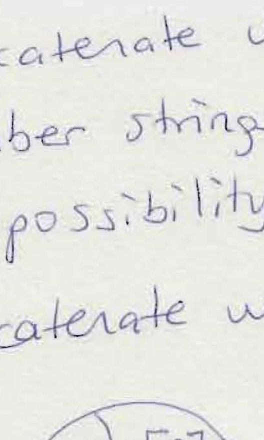
There are infinitely many equivalence classes.

b) [e]: concatenate with b.

[b]: member strings

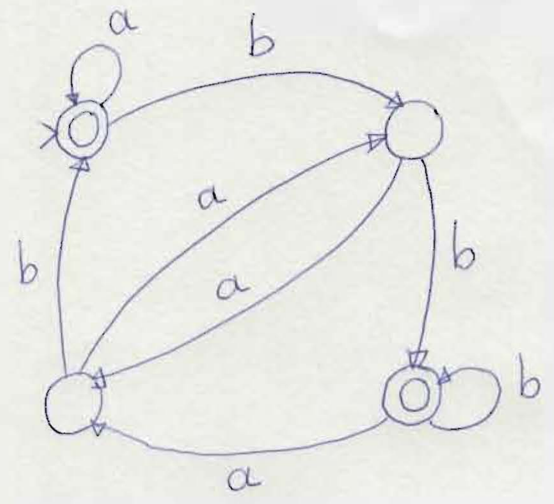
[a] [ab]: no possibility to become a member.

[ba]: concatenate with an a.

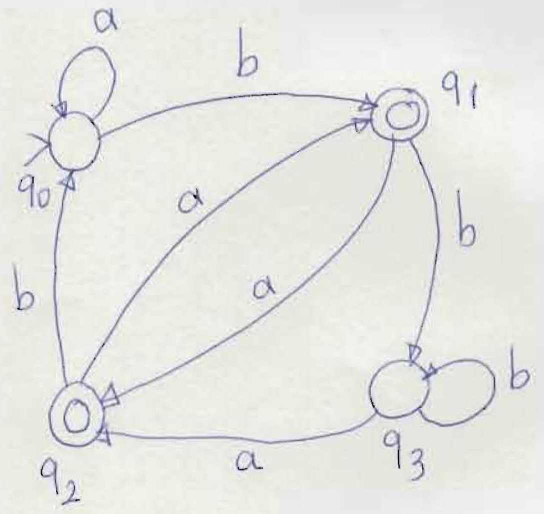


Q3.

a)

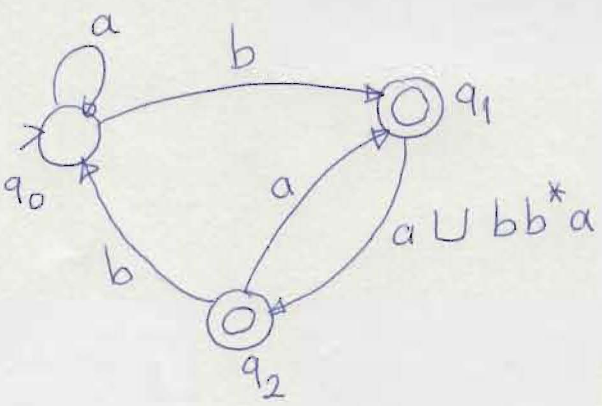


L(M)



$\overline{L} = \Sigma^* - L$

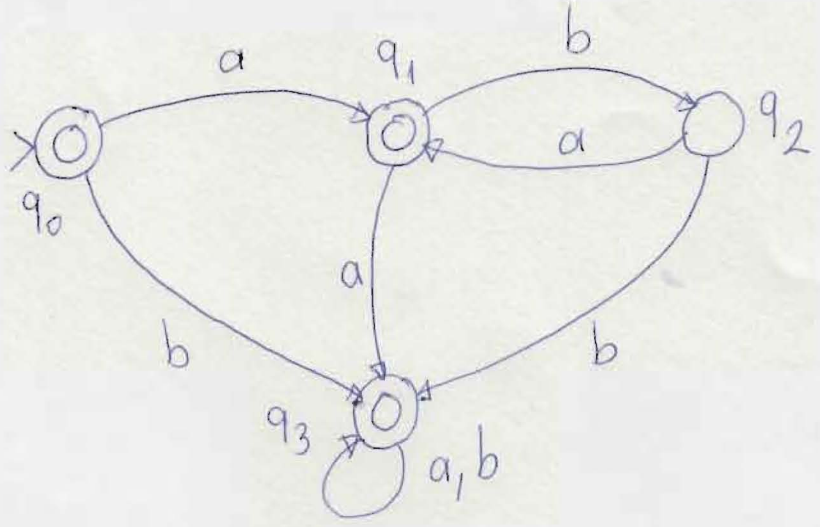
Remove q_3



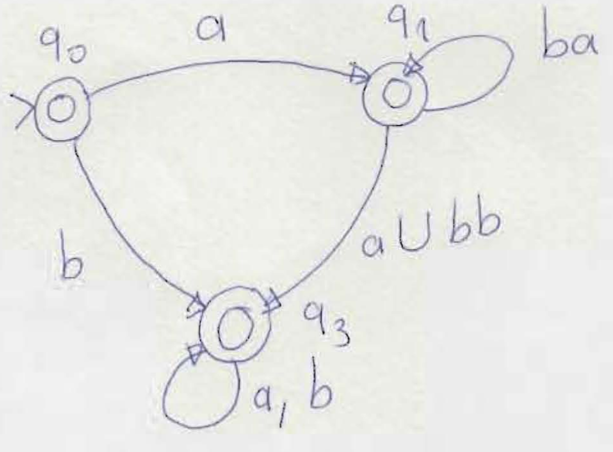
$$\cup \left(\begin{array}{l} q_1 : \; a^*b \; [(a \cup bb^*a)\,(a \cup ba^*b)]^* \\ q_2 : \; a^*b \; (a \cup bb^*a) \; [(ba^*b \cup a)(a \cup bb^*a)]^* \end{array} \right.$$

Q3.

b) $L(M)$



Remove q_2



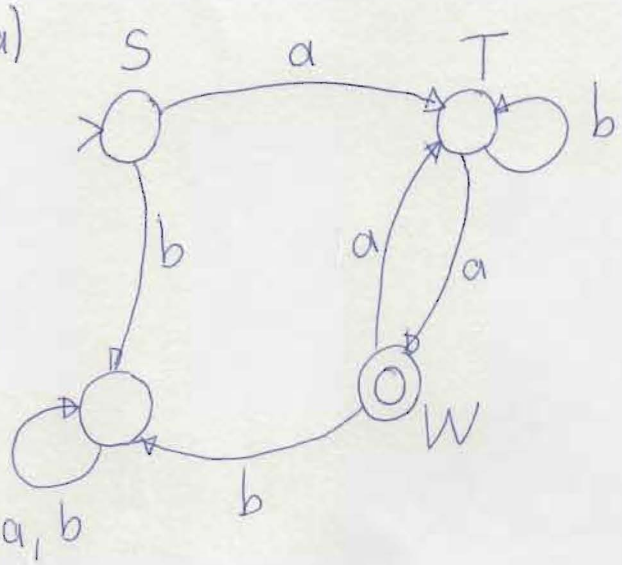
$q_0 = e$

$q_0 \cup q_1 \cup q_3$

$e \cup a(ba)^* \cup b(a \cup b)^* \cup a(ba)^*(a \cup bb)(a \cup b)^*$

Q4. $S \to aT$, $T \to bT$, $T \to a$,
$T \to aW$, $W \to e$, $W \to aT$

a)



b) $ab^*a\,(ab^*a)^* = (ab^*a)^+$