SCS2112
Automata Theory

Take Home Assignment
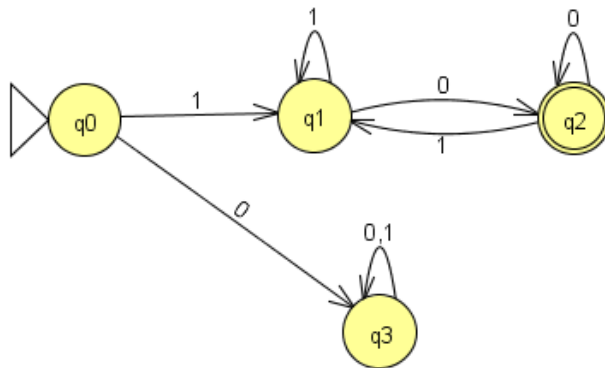
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REGISTRATION NUMBER: 2016/CS/157

Question 1

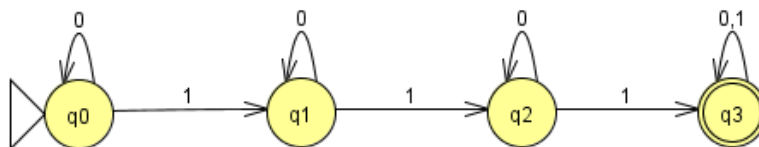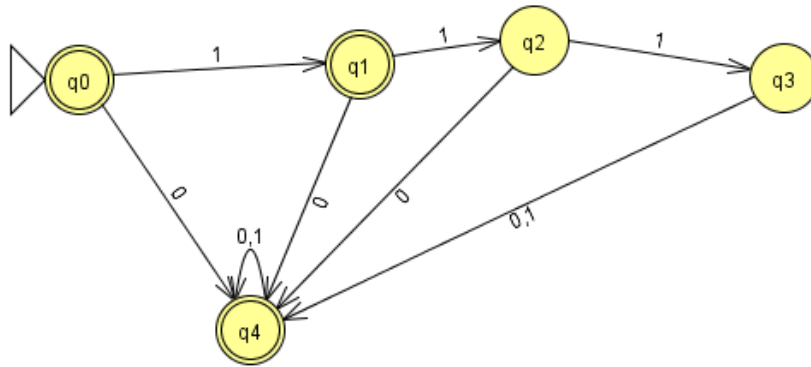| Question	M1	M2
a.	q1	q1
b.	{q2}	{q1,q4}
c.	q1->q2->q3->q1->q1	q1->q1->q1->q2->q4
d.	No	Yes
e.	No	Yes

Question 2

1.

Regular Expression: 1(0+1)*0

2.

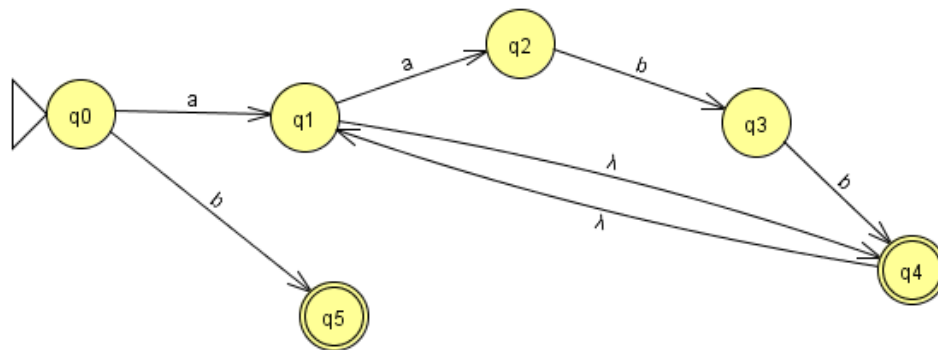

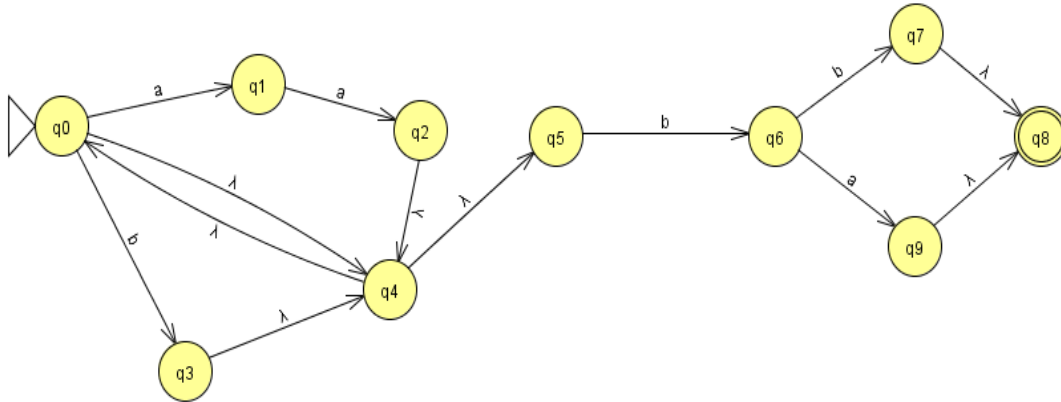Regular Expression: 0*10*10*1(0+1)*

3.

Regular Expression : 1 + [0 + 10 + 110 + 111(0+1)](0+1)*

Question 3

1. **a(abb)* + b**

2. (aa + b)* b (a +b)

Question 4

$L = \{\, 0^m 1^m 2^m \mid m >= 0 \,\}$
Let us assume that L is
regular

Then $w = 0^{n} 1^{n} 2^{n} \in L$

Consider that w is split into 3 segments x,y,z such that
$|xy| <= n$ and $|y| >= 1$

Let's take $x = 0^{a}$; $y = 0^{b}$ such that $a + b <= n$

Then $z = 0^{n-a-b} 1^{n} 2^{n}$

According to the pumping lemma of regular expressions, if L is regular, then, for any i, (i = 0, 1, 2, 3,...), $w' = xy^{i} z$ will also be a part of the language L.

But by considering the case where y = 0,

$w' = xy^{0} z = 0^{a} 0^{n-a-b} 1^{n} 2^{n} = 0^{n-b} 1^{n} 2^{n}$

As shown above, w' does not belong to the language L
Therefore, by contradiction we can say that L is not a regular language

Question 5

1.
S -> 0A0 | 1A1| 0 | 1
A -> A0 | A1 | ε

2.
A -> 0A0 | 1A1 | 1A0 | 0A1 | 0 | 1