[Assignment]

Name: Imtiaz Hossain

ID : 23101137

Section: 09

Course code : CSE331

Faculty Initial : [MLH]

Answer to the question no 1

(a)

Let, L is a regular language. For every regular language L, there is a p(pumping length). Such that, if $w \in L$ and $|w| \geq p$ then $w = xyz$.

where,

i) $xy^iz \in L$ for all $i \geq 0$

ii) $y \neq \varepsilon$

iii) $|xy| \leq p$

Let, $p = m = n$

$w = 0^{2p-1} 1^{2p+1} \in L$

$|w| \geq p$

$\Rightarrow (2p-1) \geq p$

$i=1$, $xyz \in L$

$i=2$, $xyyz = 0^{2p-1+|y|} 1^{2p+1} \notin L$

[xy only contain zeros]

$2p-1 + |y| \neq 2p+1$

$\Rightarrow |y| = 2$

If, we pump for 2 times, it becomes $p=q$, which is contradicting.

$p = 2n-1$; 1, 3, 5, . . .

$q = 2m+1$; 1, 3, 5, ...

$(p \neq q)$

$0^p 1^q$

Let, $p = 5$, $q = 7$

$i=1$, $xy^1z = \underbrace{0000}_{x}\underbrace{0}_{y} \mid \underbrace{1111111}_{z} \in L$

$i=2$, $xy^2z = \underbrace{000}_{x}\ \underbrace{00}_{y}\underbrace{00}_{y}\ \underbrace{1111111}_{z} \notin L$

So, the language L is non-regular.

Also,

$(2p-1) + |y| \neq 2n' - 1$ for any n',

then, Language w fails the required 'odd length' from the 0-block.

$\therefore L_1$ is not regular.

(b)

Let, L is a regular language. For every regular language L, there is a P (pumping length). Such that, if $w \in L$ and $|w| \geq P$ then $w = xyz$.

where,

i) $w = xy^iz \in L$ for $i \geq 0$

ii) $y \neq \varepsilon$

iii) $|xy| \leq P$

Given, ~~where~~ $n = 4x+2$

$n = 6, 8\ 10, 14, \ldots$

Let, $p = n$

so, $W = 0^P 1^{P+1}$

$= 0^{4x+2} 1^{4x+2+1}$

$\therefore W = 0^{4x+2} 1^{4x+3} \in L$

so, $W = 0^{4x+2+|y|} 1^{4x+3} \notin L$; $i = 2$

$|W| = \cancel{4x+2+}\ 0^P \geq P$

$i=2$, $xyyz = 0^{P+|y|} 1^{P+1} \notin L$

$xy^1z = \underbrace{00000}_{x}\underbrace{0}_{y} \Big| \overbrace{\underbrace{1111111}_{z}}^{P}$

$xyyz = \underbrace{00000}_{x}\underbrace{0}_{y}\underbrace{0}_{y} \Big| \underbrace{1111111}_{z}$

Now,

$4x+2+|y| \neq 4x+3$ [y consists of only 0's]

$\Rightarrow |y| \neq 1$

~~we know~~, $\cancel{|xy| \leq P \Rightarrow |y| \leq P}$

$\cancel{\therefore P \geq |y| \geq}$

$\cancel{\boxed{P \geq y \geq 1}}$

Here,

$P+|y| = P$ at $|y| \geq 1$,

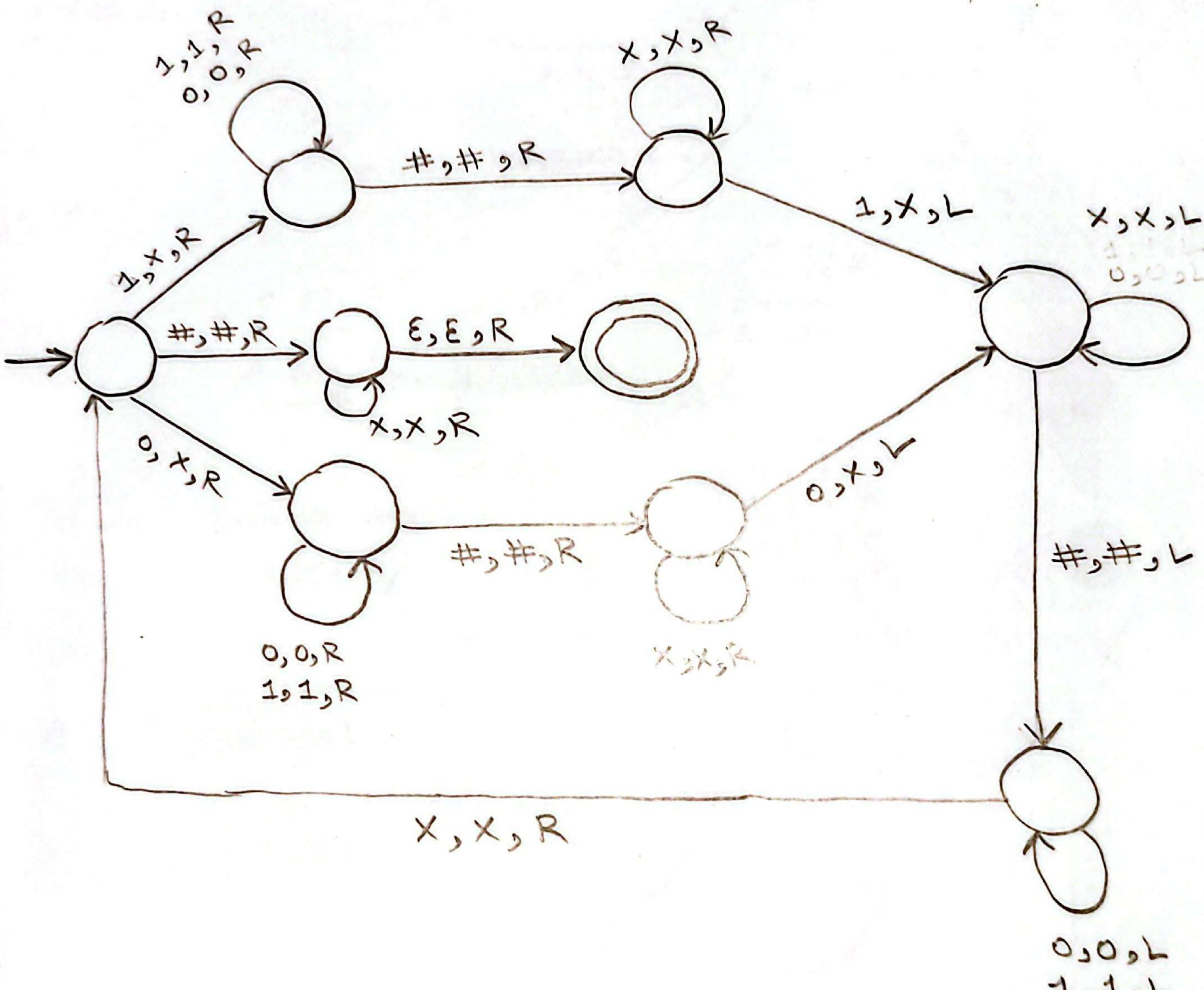
so, $w \notin L_2$, contradicting the pumping Lemma.

$\therefore$ So, the language L_2 is non-regular.

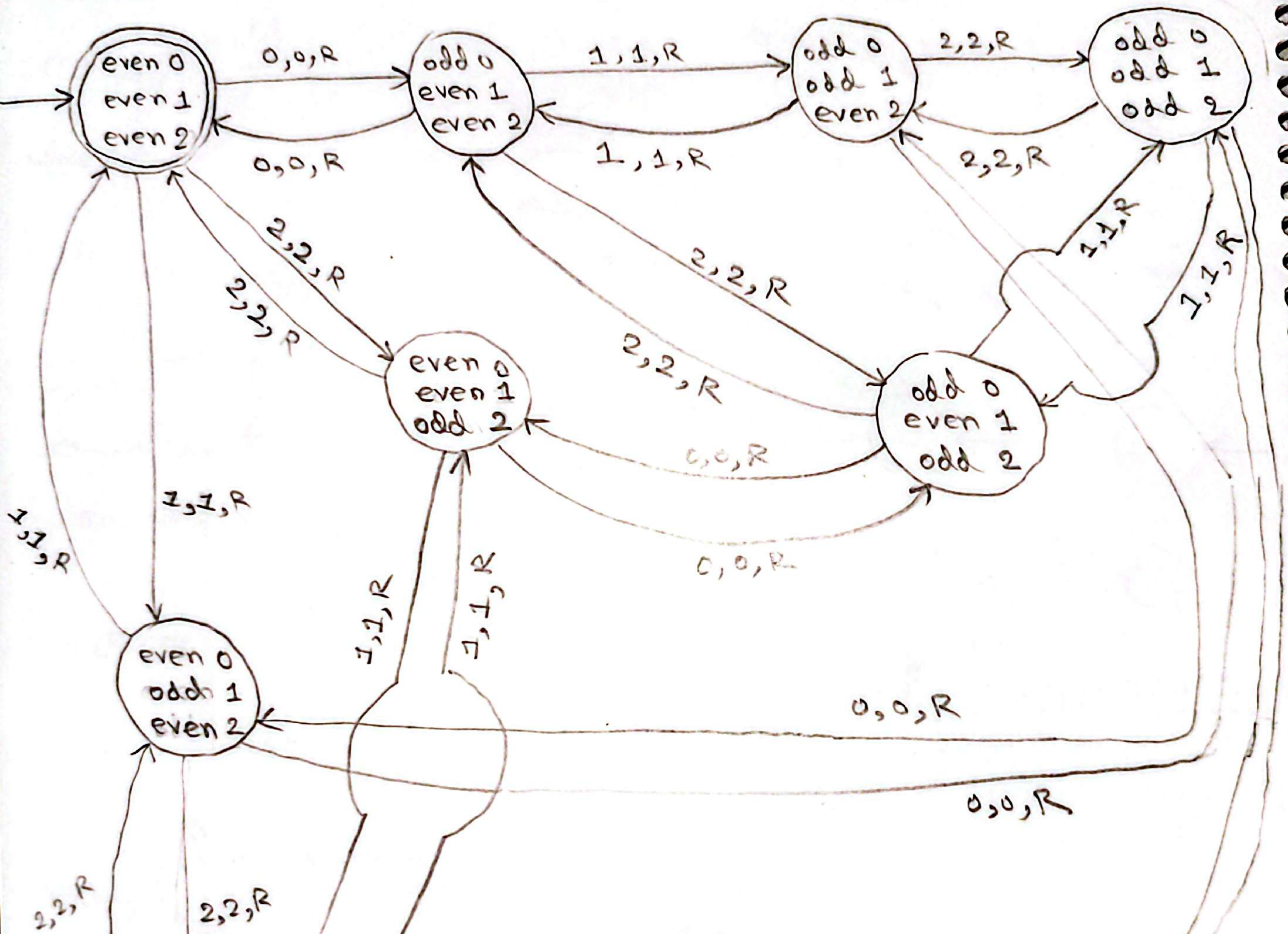
Answer to the question no 2.

ⓐ

X0101#X0101



b


even 0
even 1
even 2
odd 0
even 1
even 2
odd 0
odd 1
even 2
odd 0
odd 1
odd 2
even 0
even 1
odd 2
odd 0
even 1
odd 2
even 0
odd 1
even 2
even 0
odd 1
odd 2
0,0,R
0,0,R
1,1,R
1,1,R
2,2,R
2,2,R
2,2,R
2,2,R
2,2,R
2,2,R
1,1,R
1,1,R
0,0,R
0,0,R
1,1,R
1,1,R
1,1,R
1,1,R
0,0,R
0,0,R
2,2,R
2,2,R
0,0,R
0,0,R