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Tutorial 8

① Construct a Moore machine that takes set of all strings over $\Sigma = \{a, b\}$ as input & prints 1 as a output for every occurence of baa as substring.

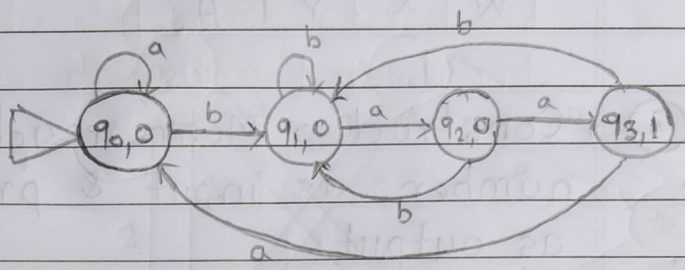
→ $M = (Q, \Sigma, \delta, q_0, \Delta, \lambda)$

$Q = \{q_0, q_1, q_2, q_3\}$

$\Sigma = \{a, b\}$

$q_0 - q_0$

$\Delta = \{0, 1\}$



transition table

	δ	a	b	o/p
→	q_0	q_0	q_1	0
	q_1	q_2	q_1	0
	q_2	q_3	q_1	0
	q_3	q_0	q_1	1

q_0	$\xrightarrow{a}$	q_0	$\xrightarrow{b}$	q_1	$\xrightarrow{a}$	q_2	$\xrightarrow{a}$	q_3
0		0		0		0		1

② Construct a Moore machine that takes set of strings over $\Sigma = \{0, 1\}$ & produce 'A' as output if input string end with 10 or produce 'B' as as output if input ends with 11 otherwise 'C'.

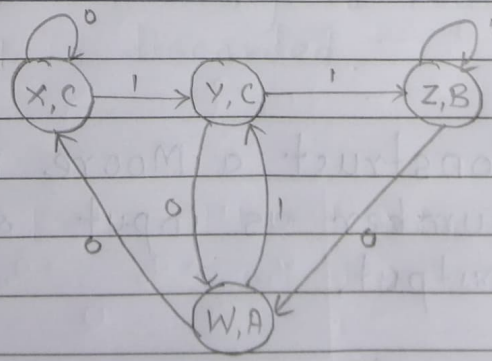
→ $M = (Q, \Sigma, \delta, q_0, \Delta, \lambda)$

$Q = \{W, X, Y, Z\}$

$\Sigma = \{0, 1\}$

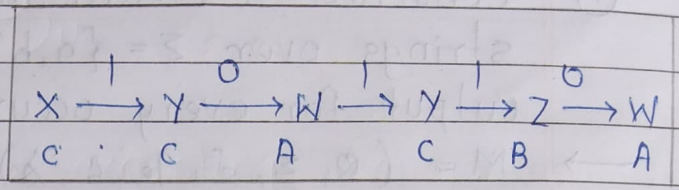
$q_0 - X$

$\Delta - \{A, B, C\}$



transition table

	δ	0	1	O/P
→	X	X	Y	C
	Y	W	Z	C
	Z	W	Z	B
	W	X	Y	A



(3) Construct a Moore machine that takes binary number as input & produces 'residue modulo 3' as output.

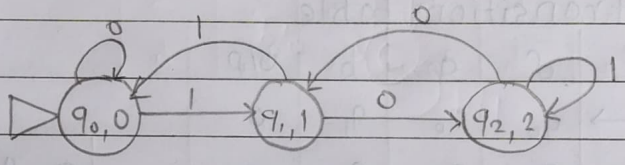
→ $M = (Q, \Sigma, q_0, \delta, \Delta, \lambda)$

$Q = \{q_0, q_1, q_2\}$

$\Sigma = \{0, 1\}$

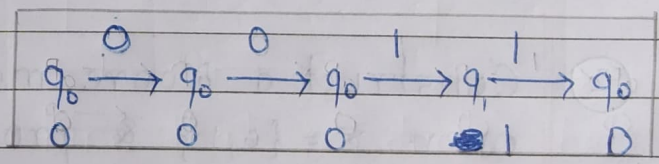
$q_0 = q_0$

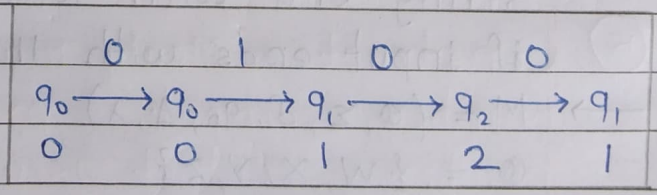
$\Delta = \{0, 1, 2\}$



transition table

	δ	0	1	O/P
→	q_0	q_0	q_1	0
	q_1	q_2	q_0	1
	q_2	q_1	q_2	2





(4) Construct a Moore machine that takes base 4 number as input & produces modulo 5 as output.

→ $M = (Q, \Sigma, \delta, q_0, \Delta, \lambda)$

$Q = \{q_0, q_1, q_2, q_3, q_4\}$

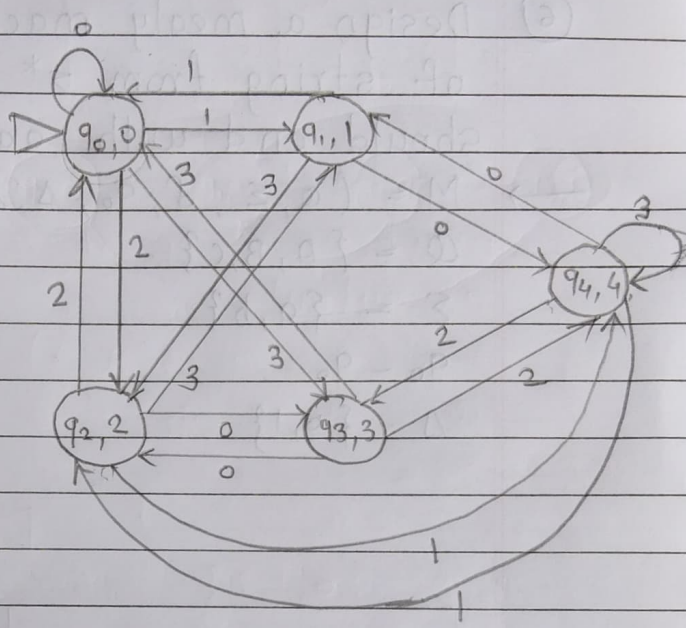
$\Sigma = \{0, 1, 2, 3\}$

$q_0 - q_0$

$\Delta = \{0, 1, 2, 3, 4\}$

transition table

	δ	0	1	2	3	o/p
→	q_0	q_0	q_1	q_2	q_3	0
	q_1	q_4	q_0	q_1	q_2	1
	q_2	q_3	q_4	q_0	q_1	2
	q_3	q_2	q_3	q_4	q_0	3
	q_4	q_1	q_2	q_3	q_4	4



1	1	0	
$q_0 \rightarrow$	$q_1 \rightarrow$	$q_0 \rightarrow$	q_0
0	1	0	0

1	1	1	
$q_0 \rightarrow$	$q_1 \rightarrow$	$q_0 \rightarrow$	q_1
0	1	0	0

(5) Construct a Mealy machine that takes binary number as input & produces 2's complement of that number as output assume the string is read from LSB to MSB & end carry is discarded.

→ $M = (Q, \Sigma, \delta, q_0, \Delta, \lambda)$

$Q = \{q_0, q_1\}$

$\Sigma = \{0, 1\}$

$q_0 - q_0$

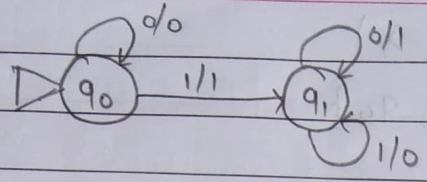
$\Delta - \{0, 1\}$

Ex. - 1 1 0 1 → binary no.

0 0 1 0 → 1's complement

\+ 1

0 0 1 1 → 2's complement



(6) Design a mealy machine accepting language consisting of string from Σ^* where $\Sigma = \{a, b\}$ & string should end with aa or bb.

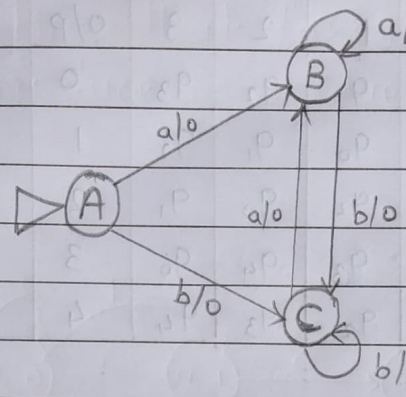
→ $M = (Q, \Sigma, \delta, q_0, \Delta, \lambda)$

$Q = \{A, B, C\}$

$\Sigma = \{a, b\}$

$q_0 - q_0$

$\Delta - \{0, 1\}$



A —a/0→ B —a/1→ B —b/0→ C	A —b/0→ C —a/0→ B —a/1→ A

(7) Construct a mealy machine that produces the 1's complement of any binary input number.

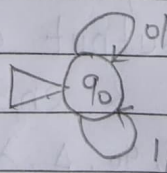
→ $M = (Q, \Sigma, \delta, q_0, \Delta, \lambda)$

$Q = \{q_0\}$

$\Sigma = \{0, 1\}$

$q_0 - q_0$

$\Delta - \{0, 1\}$



$q_0 \xrightarrow{1/0} q_0 \xrightarrow{1/0} q_0 \xrightarrow{0/1} q_0 \xrightarrow{0/1} q_0$

(8) Construct a mealy machine that prints 'a' whenever the sequence '01' is encountered in any binary input string.

→ $M = (Q, \Sigma, \delta, q_0, \Delta, \lambda)$

$\Sigma = \{q_0, q_1, q_2\}$

$\Sigma = \{0, 1\}$

$q_0 - q_0$

$\Delta - \{a\}$