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Assignment - 1

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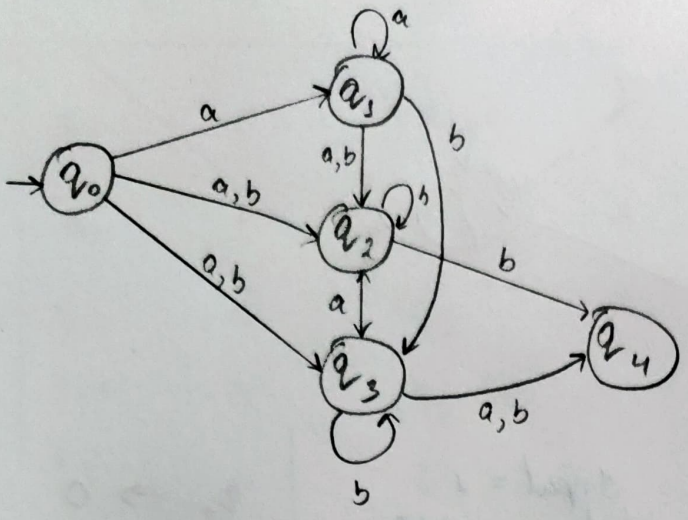
1.

a)



NFA

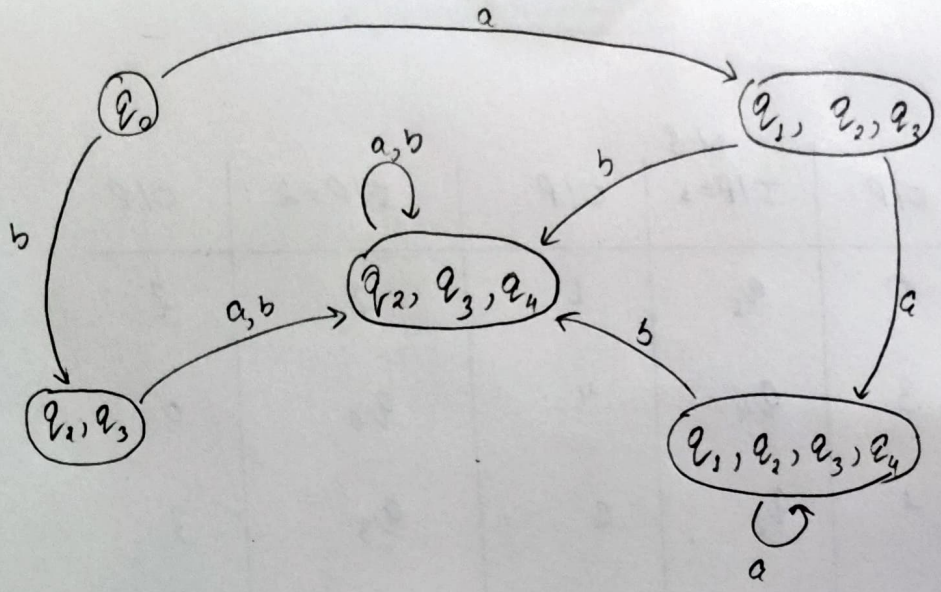
PS	a	b
→ q_0	q_1, q_2, q_3	q_2, q_3
q_1	q_1, q_2	q_2, q_3
q_2	q_3	q_2, q_4
q_3	q_2, q_4	q_3, q_4
q_4	–	–

DFA

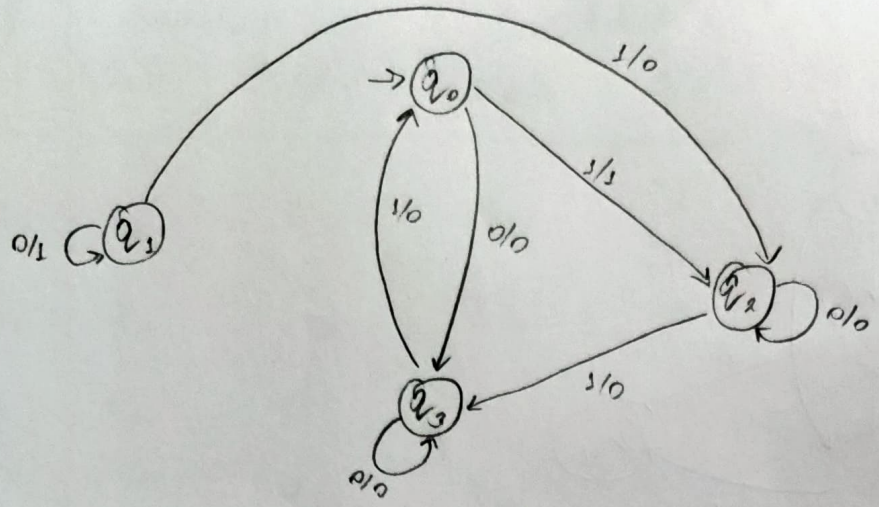
PS	a	b
→ q_0	$\{q_1, q_2, q_3\}$	$\{q_2, q_3\}$
$\{q_1, q_2, q_3\}$	$\{q_1, q_2, q_3, q_4\}$	$\{q_2, q_3, q_4\}$
$\{q_2, q_3\}$	$\{q_2, q_3, q_4\}$	$\{q_2, q_3, q_4\}$
$\{q_1, q_2, q_3, q_4\}$	$\{q_1, q_2, q_3, q_4\}$	$\{q_2, q_3, q_4\}$
$\{q_2, q_3, q_4\}$	$\{q_2, q_3, q_4\}$	$\{q_2, q_3, q_4\}$

1.

a)



b)



PS	NS Input = 0 state	O/P	Input = 1 state	O/P
→ q_0	q_3	0	q_2	1
q_1	q_3	1	q_2	0
q_2	q_2	0	q_3	0
q_3	q_3	0	q_0	0

$q_0 \rightarrow 0$
$q_1 \rightarrow 1$
$q_2 \rightarrow 0, 1$
$q_3 \rightarrow 0$

↳ q_2 gets split into two ∵ there are two outputs for the same state.

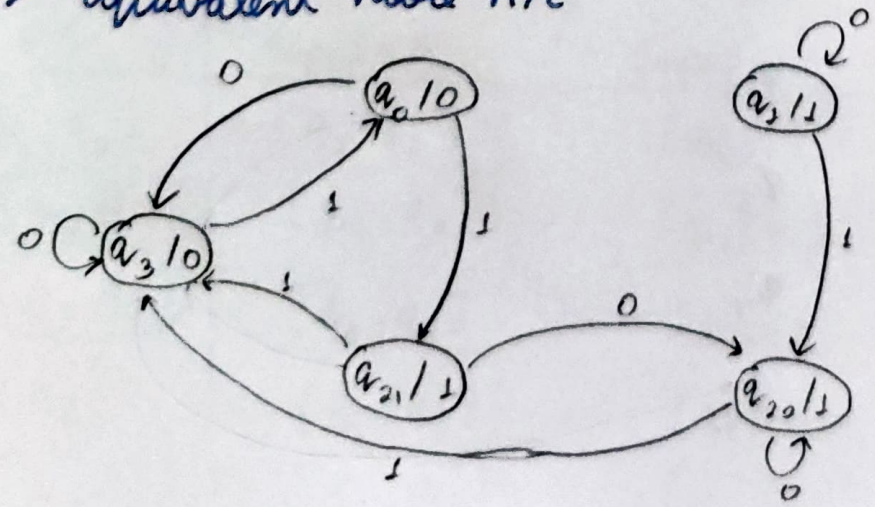
i.e. q_2 → q_{20} - 0, q_{21} - 1

PS	NS Input = 0 state	O/P	Input = 1 state	O/P
q_0	q_3	0	q_{21}	1
q_1	q_1	1	q_{20}	0
q_{20}	q_{20}	0	q_{21}	0
q_{21}	q_{20}	0	q_3	0
q_3	q_3	0	q_0	0

→ Intermediate table

PS	NS		O/P
	Input = 0	Input = 1	
q_0	q_3	q_{21}	0
q_1	q_1	q_{20}	1
q_{20}	q_{20}	q_3	0
q_{21}	q_{20}	q_3	1
q_3	q_3	q_0	0

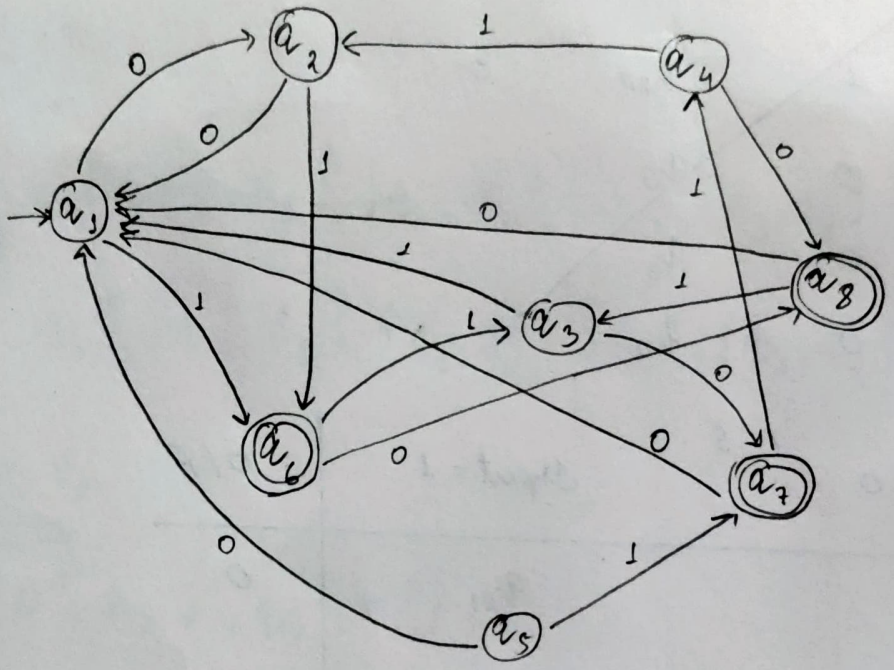
↳ Equivalent Moore M/c



2.

a) $M = (\{q_1, q_2, q_3, q_4, q_5, q_6, q_7, q_8\}, \{0,1\}, \delta, q_1, \{q_6, q_7, q_8\})$

where δ is



PS	NS	
	Input = 0	Input = 1
→ q_1	q_2	q_6
q_2	q_1	q_6
q_3	q_7	q_1
q_4	q_8	q_1
q_5	q_1	q_7
(*) q_6	q_8	q_3
(*) q_7	q_1	q_4
(*) q_8	q_1	q_3

$\pi_0 = \{\{q_6, q_7, q_8\}, \{q_1, q_2, q_3, q_4, q_5\}\}$

$\pi_1 = \{\{q_6\}, \{q_7, q_8\}, \{q_1, q_2, q_5\}, \{q_3, q_4\}\}$

~~q_7, q_8~~ $\quad\quad$ q_3, q_4

$\pi_2 = \{\{q_6\}, \{q_7, q_8\}, \{q_1, q_2\}, \{q_5\}, \{q_3, q_4\}\}$

$\pi_3 = \{\{q_6\}, \{q_7, q_8\}, \{q_1, q_2\}, \{q_5\}, \{q_3, q_4\}\}$

$\pi_2 = \pi_3$

$M' = (Q', \Sigma, \delta', q_0', F')$

$Q' = \{[q_6], [q_7, q_8], [q_1, q_2], [q_5], [q_3, q_4]\}$

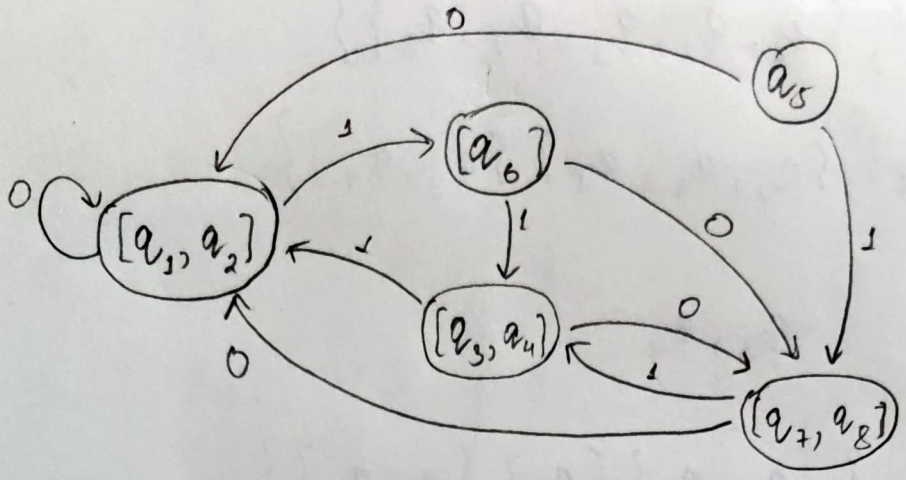
$\Sigma = [0, 1]$

$q_0' = [q_1]$

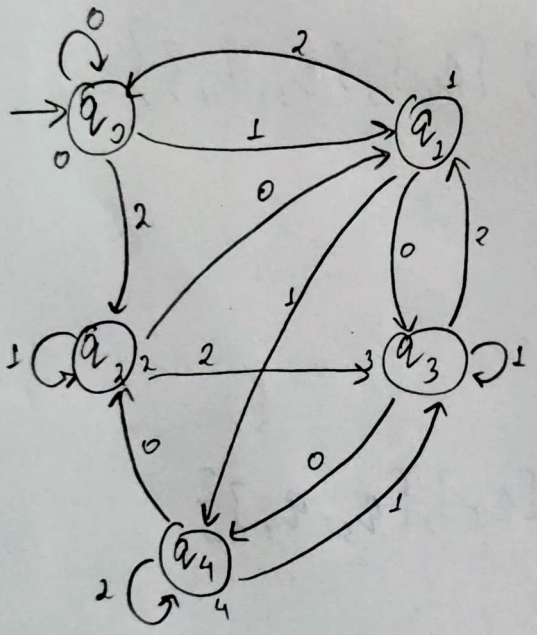
$F' = \{[q_6], [q_7, q_8]\}$

$\delta' =$

	PS / NS	Input = 0	Input = 1
→	$[q_1, q_2]$	$[q_1, q_2]$	$[q_6]$
	$[q_6]$	$[q_7, q_8]$	$[q_3, q_4]$
	$[q_7, q_8]$	$[q_1, q_2]$	$[q_3, q_4]$
	$[q_5]$	$[q_1, q_2]$	$[q_7, q_8]$
	$[q_3, q_4]$	$[q_7, q_8]$	$[q_1, q_2]$



b)



Moore M/C

PS	I/P = 0	I/P = 1	I/P = 2	O/P
q_0	q_0	q_1	q_2	0
q_1	q_3	q_4	q_0	1
q_2	q_1	q_2	q_3	2
q_3	q_4	q_3	q_1	3
q_4	q_2	q_3	q_4	4

~~Moore M/C~~

Mealy M/C

PS	NS I/P=0	O/P	NS I/P=1	O/P	NS I/P=2	O/P
q_0	q_0	0	q_1	1	q_2	2
q_1	q_3	3	q_4	4	q_0	0
q_2	q_1	1	q_2	2	q_3	3
q_3	q_4	4	q_3	3	q_1	1
q_4	q_2	2	q_3	3	q_4	4