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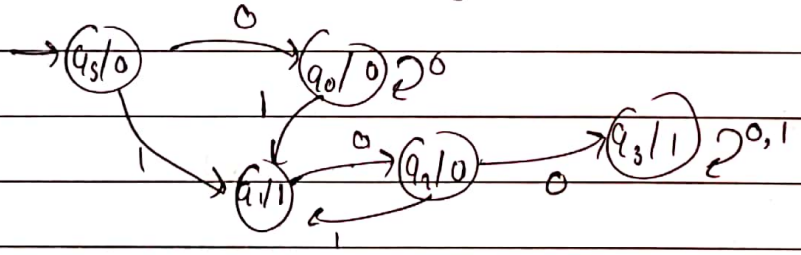
# Tutorial 4

1] Let $q_0 \rightarrow$ string ending in 0
$q_1 \rightarrow$ string ending in 1
$q_2 \rightarrow$ string ending in '10'
$q_3 \rightarrow$ string ending in "100
$q_4 \rightarrow$ string ending in 'ε'

$\delta : Q \times \Sigma \rightarrow Q \quad \Sigma = \{0,1\} \quad \Delta = \{0,1\} \quad \lambda : Q \times \Sigma = \Delta$

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

| transition | Q | 0 | 1 | O/P |
|---|---|---|---|---|
| → | $q_s$ | $q_0$ | $q_1$ | 0 |
| | $q_0$ | $q_0$ | $q_1$ | 0 |
| | $q_1$ | $q_2$ | $q_1$ | 1 |
| | $q_2$ | $q_3$ | $q_1$ | 0 |
| | $q_3$ | $q_2$ | $q_3$ | 1 |




Q2] Let $q_0 \rightarrow$ even no of 1s $q_1 \rightarrow$ odd no of 1s

$Q = \{q_0, q_1\} \quad \Delta = \{EVEN/ODD\}$

$\Sigma = \{0,1\} \quad \delta : Q \times \Sigma = Q$

$\lambda : Q \times \Sigma = \Delta \quad q_0 =$ initial state

Moore transition table:

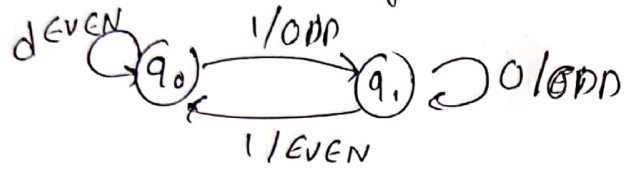
| Q | 0 | 1 | O/P |
|---|---|---|---|
| → $q_0$ | $q_0$ | $q_1$ | EVEN |
| $q_1$ | $q_1$ | $q_0$ | ODD |

Mealy Transition Table:

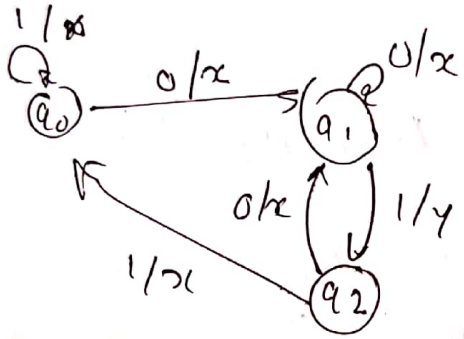
| Q | 0 | 1 |
|---|---|---|
| → $q_0$ | $q_0$ Even | $q_1$ ODD |
| $q_1$ | $q_1$ ODD | $q_0$ EVEN |

~~Moore D.~~

Mealy Transition Diagram:




Q3] [Given]




Moore Transition Table:

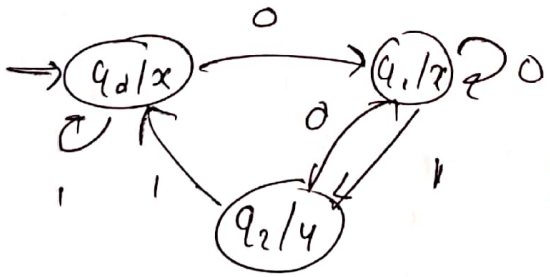
| Q | 0 | 1 | o/p |
|---|---|---|---|
| → $q_0$ | $q_1$ | $q_0$ | x |
| $q_1$ | $q_1$ | $q_2$ | x |
| $q_2$ | $q_1$ | $q_0$ | y |

$Q = \{q_0, q_1, q_2\}$ $\Sigma = \{0, 1\}$

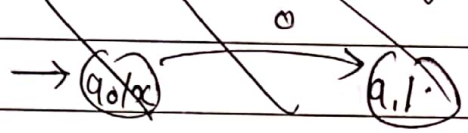
$\Delta = \{x, y\}$ $q_0 \rightarrow$ initial state

$\delta = Q \times \Sigma = Q$

Transition Diagram



Q4] Moore Transition Diagram:

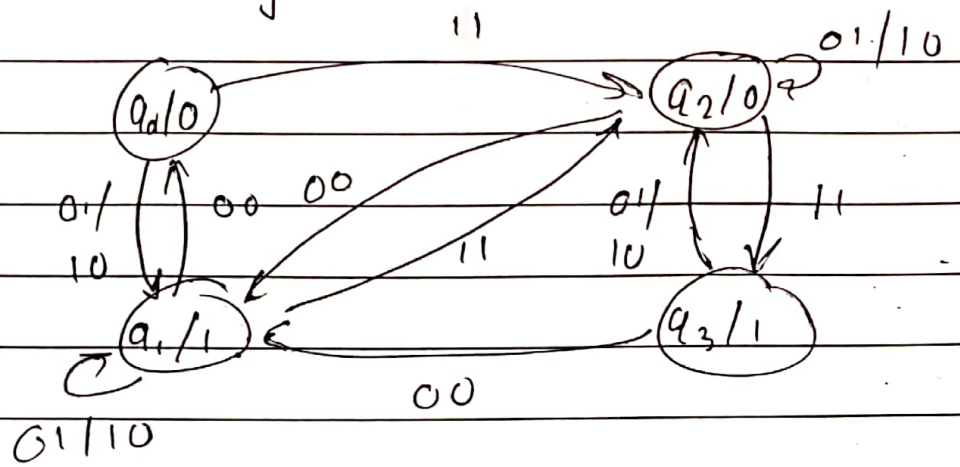



let $q_0$ → state for sum is '0'
$q_1$ → state for sum is '1'
$q_2$ → state for carry is '0'
$q_3$ → state for carry is '1'

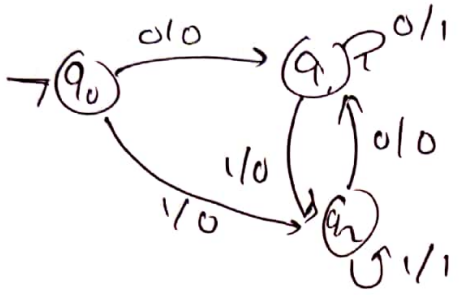
$Q = \{q_0, q_1, q_2, q_3\}$ $\Sigma = \{0, 1\}$
$\Delta = \{0, 1\}$ $q_0$ → initial state
$m = (Q, \Sigma, T, \delta, q_0, z, F)$
Consider $\Sigma$ as combination of 2 i/ps

| | 00 | 01 | 10 | 11 | o/p |
|---|---|---|---|---|---|
| $q_0$ | $q_0$ | $q_1$ | $q_1$ | $q_2$ | 0 |
| $q_1$ | $q_0$ | $q_1$ | $q_1$ | $q_2$ | 1 |
| $q_2$ | $q_1$ | $q_2$ | $q_2$ | $q_3$ | 0 |
| $q_3$ | $q_1$ | $q_2$ | $q_2$ | $q_3$ | 1 |

Transition Diagram



5] Mealy




| | 0 | 1 |
|---|---|---|
| → $q_0$ | $q_0$,0 | $q_2$,0 |
| $q_1$ | $q_1$,1 | $q_2$,0 |
| $q_2$ | $q_1$,0 | $q_2$,1 |

Moore

| Q / Σ | 0 | 1 | o/p |
|---|---|---|---|
| $q_s$ | $q_0$ | $q_1$ | ε |
| $q_0$ | $q_0'$ | $q_1$ | 0 |
| $q_0'$ | $q_0'$ | $q_1$ | 1 |
| $q_1$ | $q_0$ | $q_1'$ | 0 |
| $q_1'$ | $q_0$ | $q_1'$ | 1 |

Transition Diagram: