F.S.M. ⇒ F.A → w/o o/p ⇒ $M = (Q, \Sigma, \delta, q_0, F)$ → NFA, DFA
→ with o/p ⇒ $M = (Q, \Sigma, \Delta, \delta, \lambda, q_0)$ → MOORE, MEALY

In Moore & Mealy

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

Q, Σ, δ, q_0 ⇒ Same as DFA

i.e. δ maps: $Q \times \Sigma \to Q$

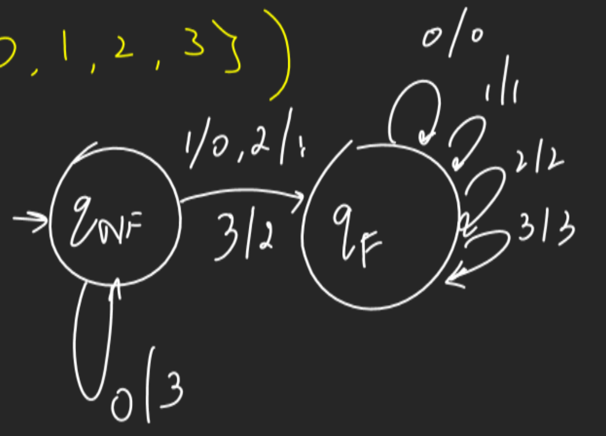
Δ: finite set of o/p symbols

λ: Transition function { MOORE: $Q \to \Delta$; MEALY: $Q \times \Sigma \to \Delta$ }

Example: Design Moore & Mealy to decrement a number expressed in base 4 (i.e. input over the set {0, 1, 2, 3})

Sol^n:

```
 1 2 0 3        1 2 0 0
 -     1        -     1
 -------        -------
 1 2 0 2        1 1 3 3
```



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

$Q = \{q_{NF}, q_F\}$, $\Sigma = \{0, 1, 2, 3\}$, $\Delta = \{0, 1, 2, 3\}$

$q_0 = q_{NF}$

$\delta: Q \times \Sigma \to Q$

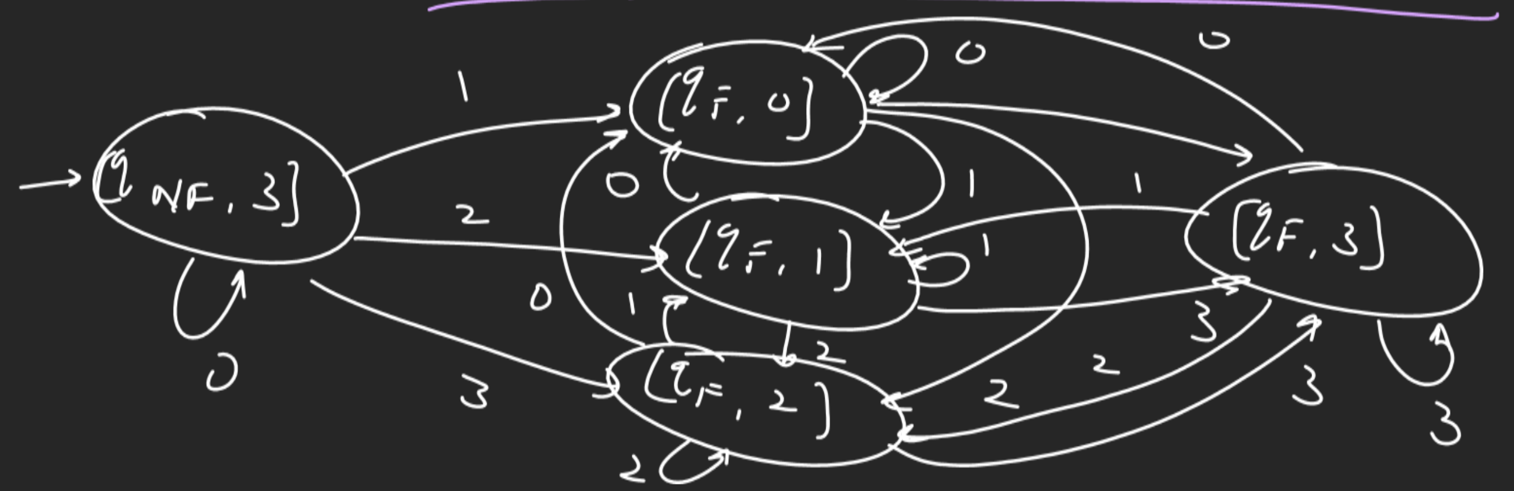
Q \ Σ	0	1	2	3
q_{NF}	$q_{NF}, 3$	$q_F, 0$	$q_F, 1$	$q_F, 2$
q_F	$q_F, 0$	$q_F, 1$	$q_F, 2$	$q_F, 3$

$\lambda: Q \times \Sigma \to \Delta$

Q \ Σ	0	1	2	3
q_{NF}	3	0	1	2
q_F	0	1	2	3

Equivalent Moore

Q' \ Σ	0	1	2	3
S.S. $[q_{NF}, 3]$	$[q_{NF}, 3]$	$[q_F, 0]$	$[q_F, 1]$	$[q_F, 2]$
$[q_F, 0]$	$[q_F, 0]$	$[q_F, 1]$	$[q_F, 2]$	$[q_F, 3]$
$[q_F, 1]$	$[q_F, 0]$	$[q_F, 1]$	$[q_F, 2]$	$[q_F, 3]$
$[q_F, 2]$	"	"	"	"
$[q_F, 3]$	"	"	"	"

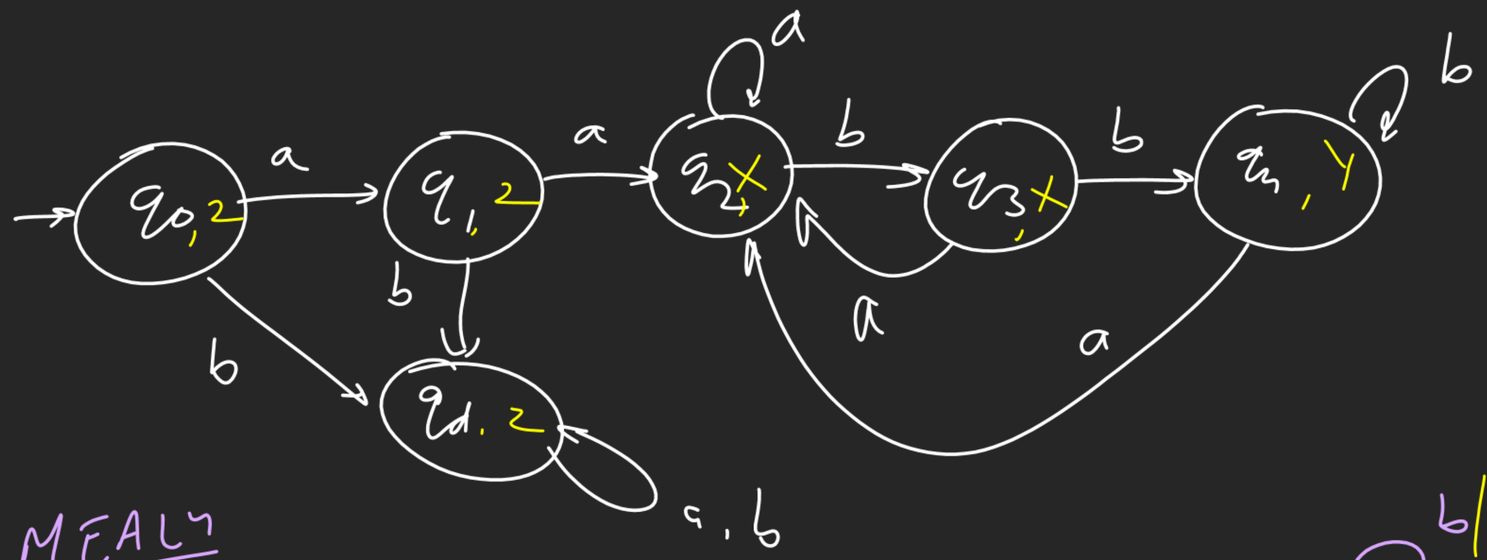


Ex 2. Design Moore & Mealy that receives i/p over {a, b} & generates output

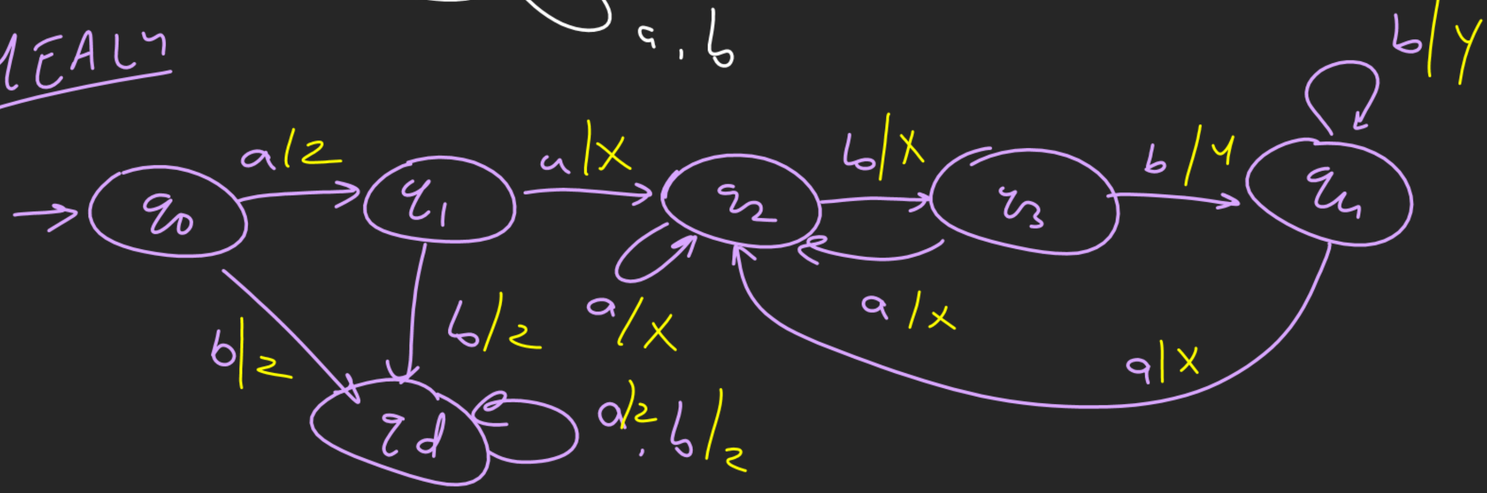
X → if i/p starts with aa but not ends with bb

Y → i/p starts with aa and ends with bb

Z → if i/p does not start with aa



MEALY



Assignment 5

Equivalence of Moore & Mealy.