CS & IT ENGINEERING

Theory of Computation

Finite Automata

Lecture No. 16

By- DEVA Sir

01 Moore Machine

02 Mealy Machine

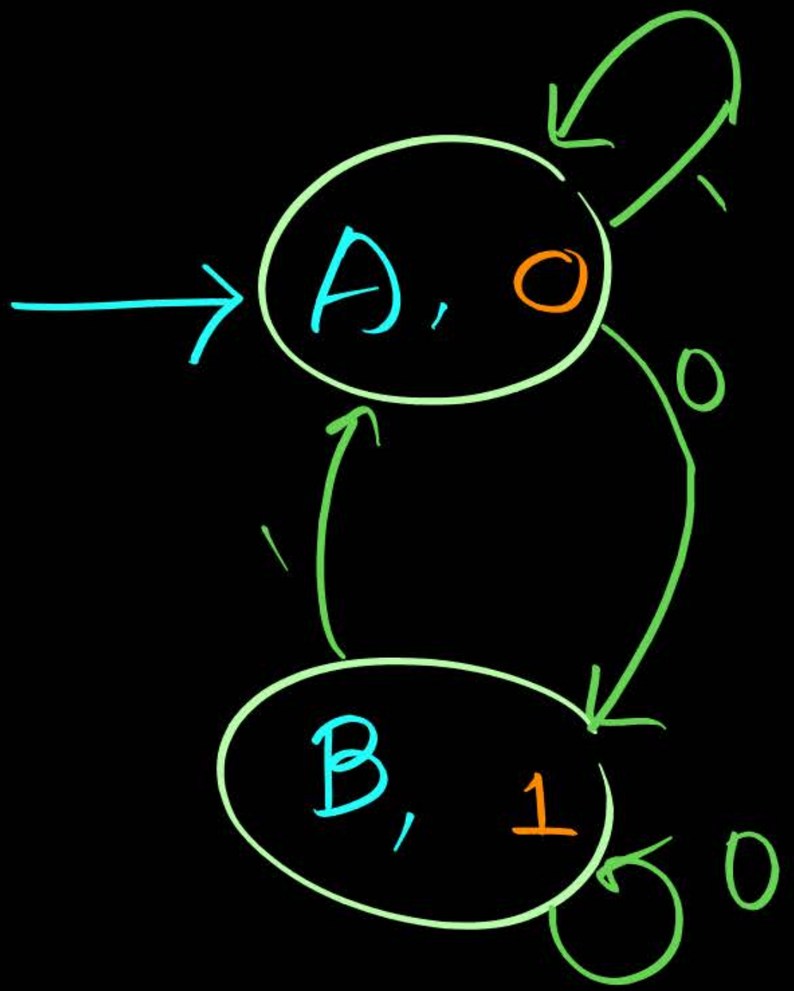
03 pumping Lemma

04

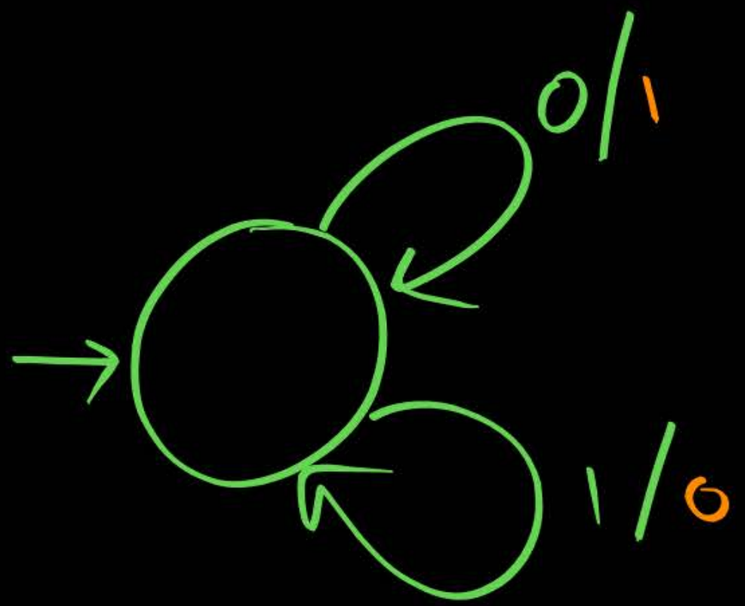
05

① 1's complement

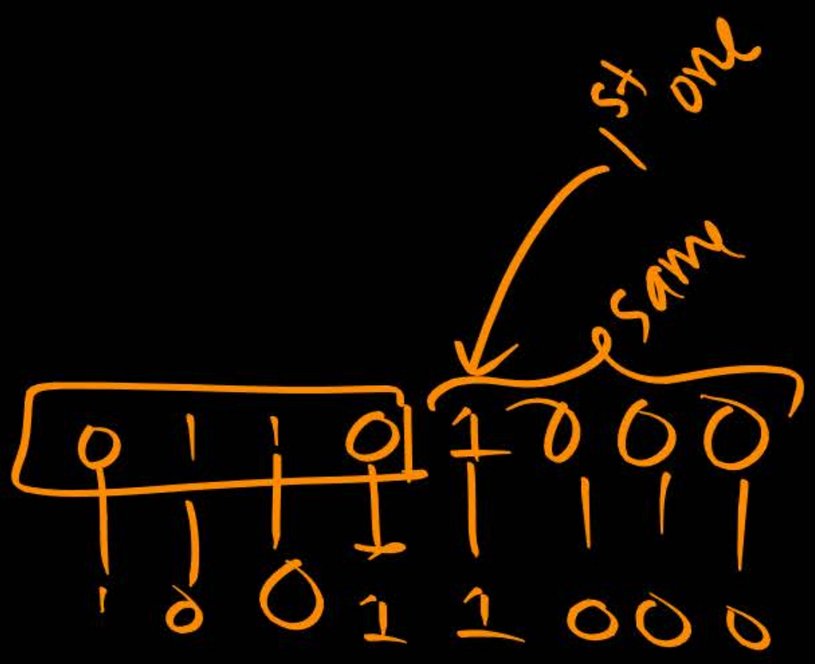
Moore M/c



Mealy M/c



② Two's Complement :

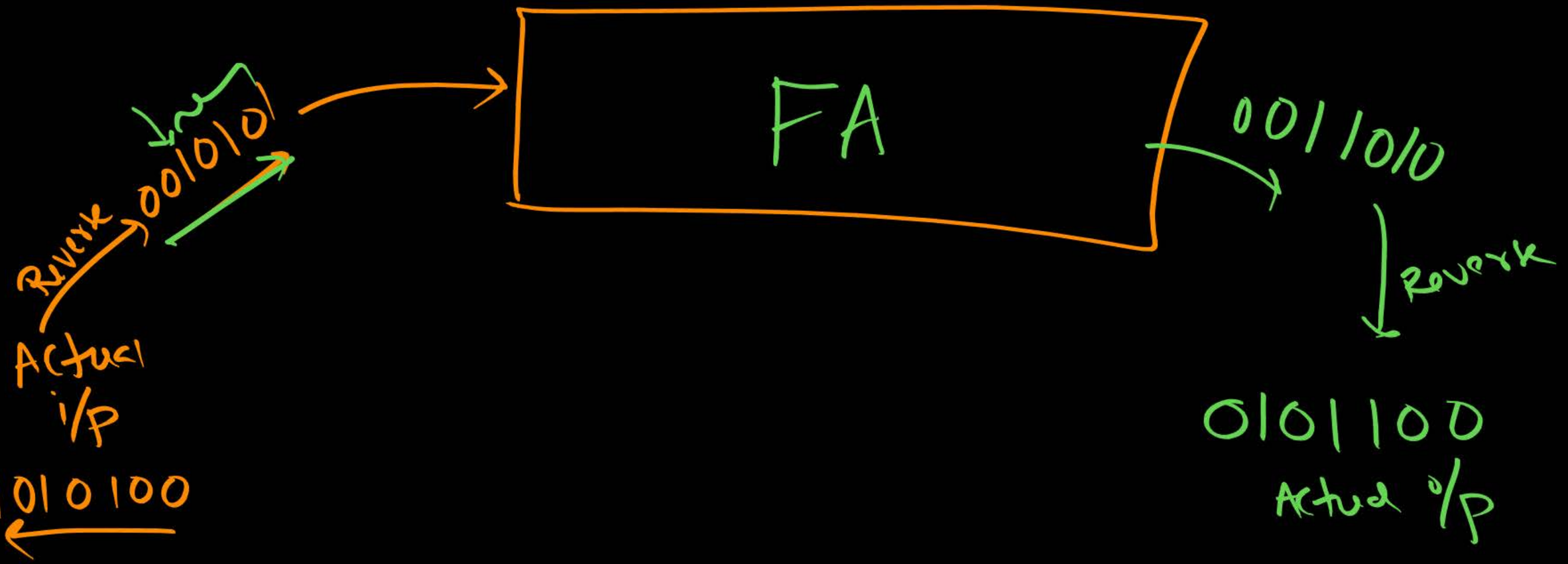


$x = 0\,0\,1\,1\,0\,0\,1\,1$ (First one)

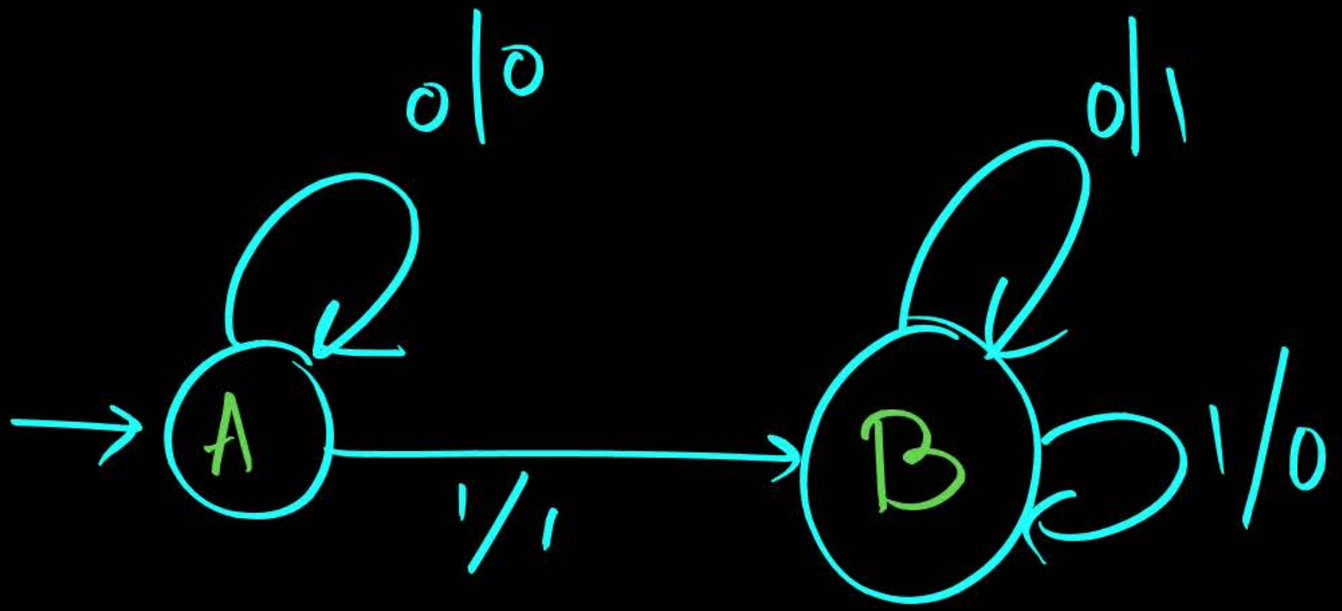
is comp of x = $1\,1\,0\,0\,1\,1\,0\,0$

$+1$

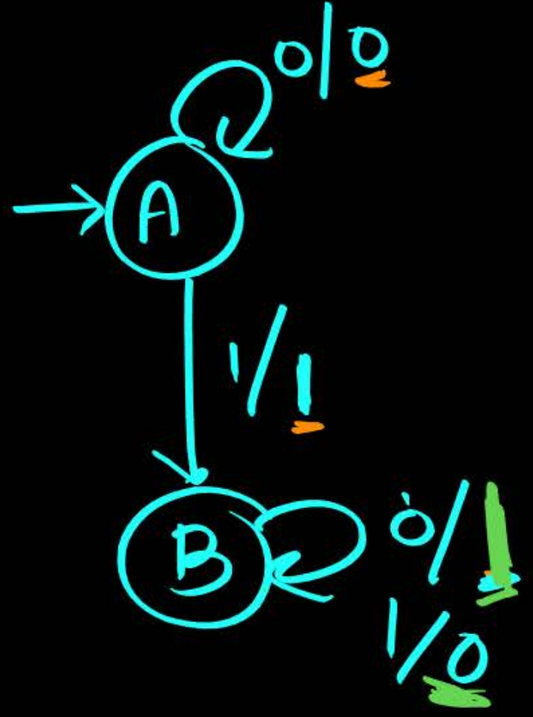
$1\,1\,0\,0\,1\,1\,0\,1$

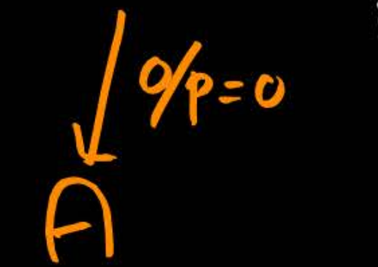

FA
0010101
Reverse
Actual i/p
1010100
0011010
Reverse
0101100
Actual o/p

Mealy M/c :

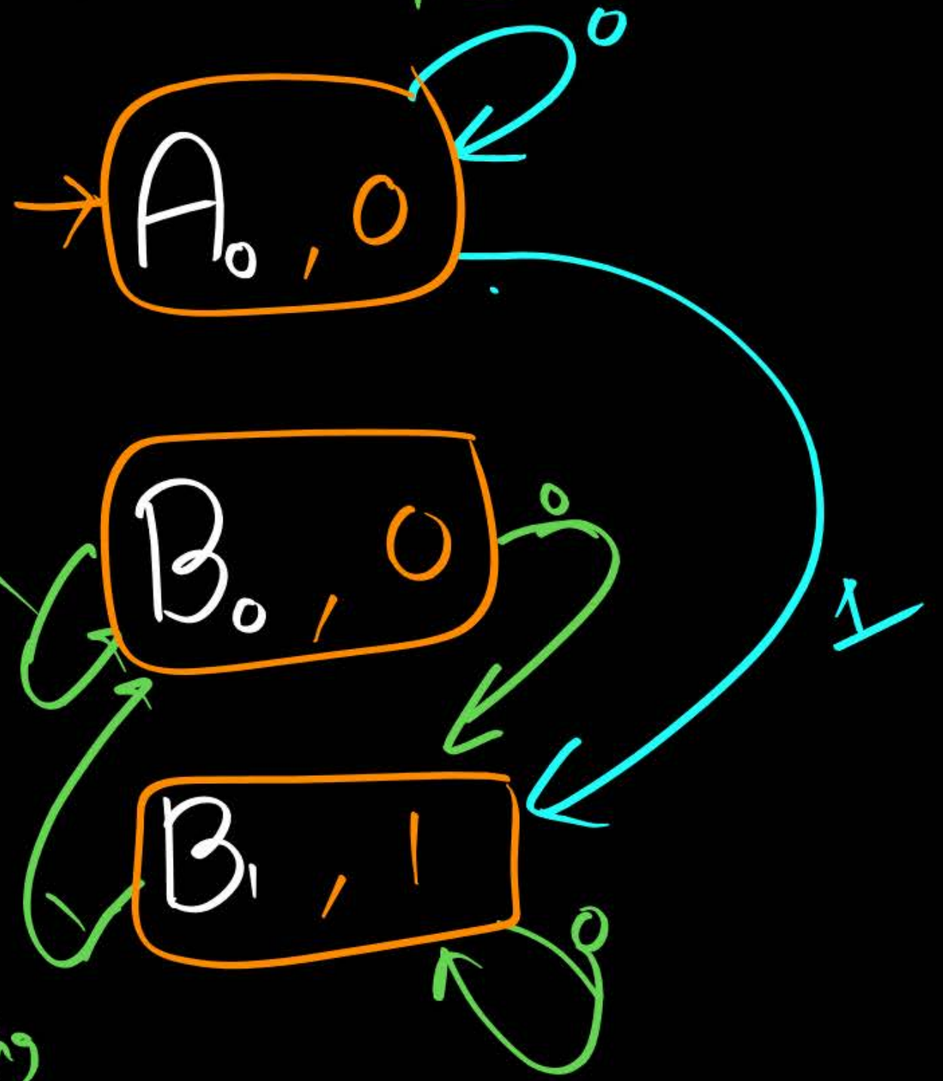


Mealy M/C ⟹ Moore M/C



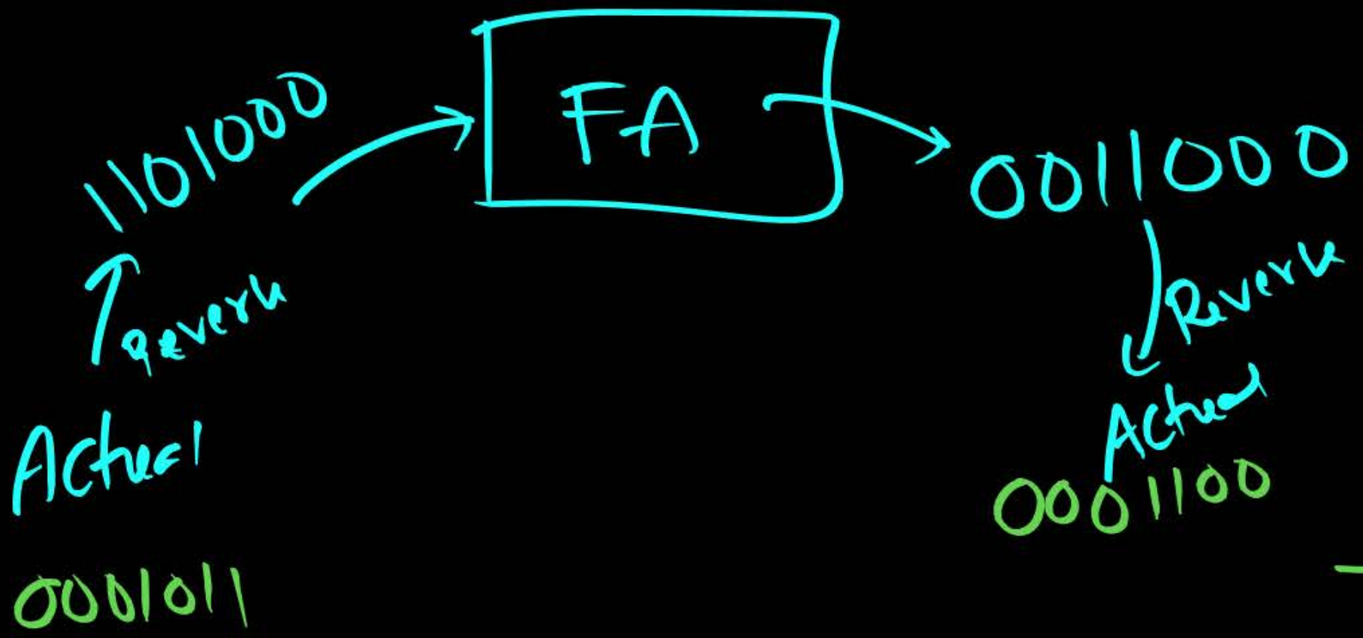


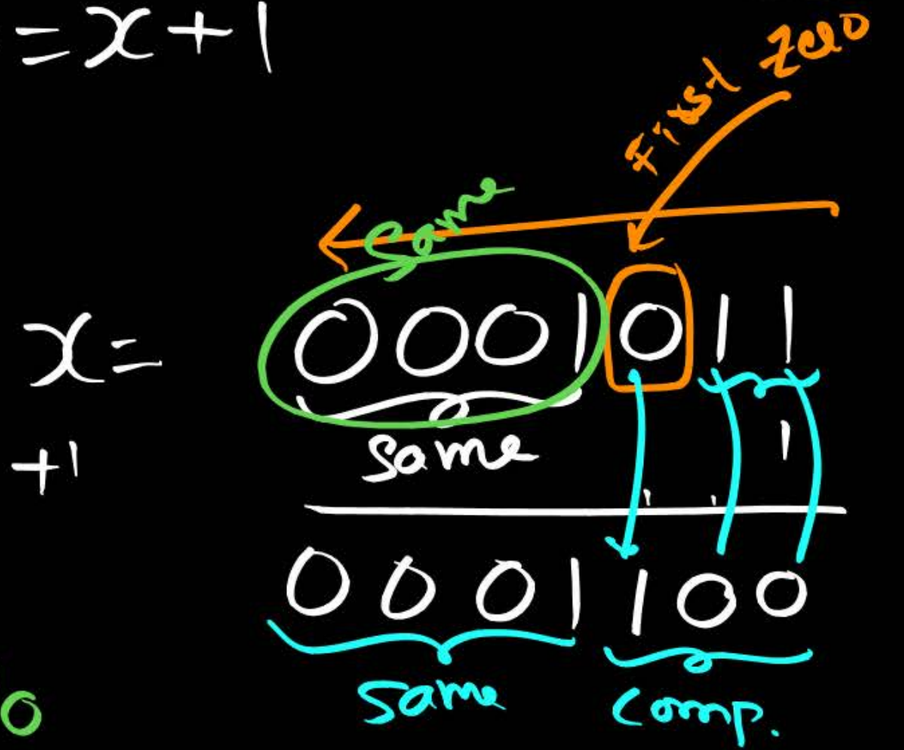
Find outputs which are incoming towards every state

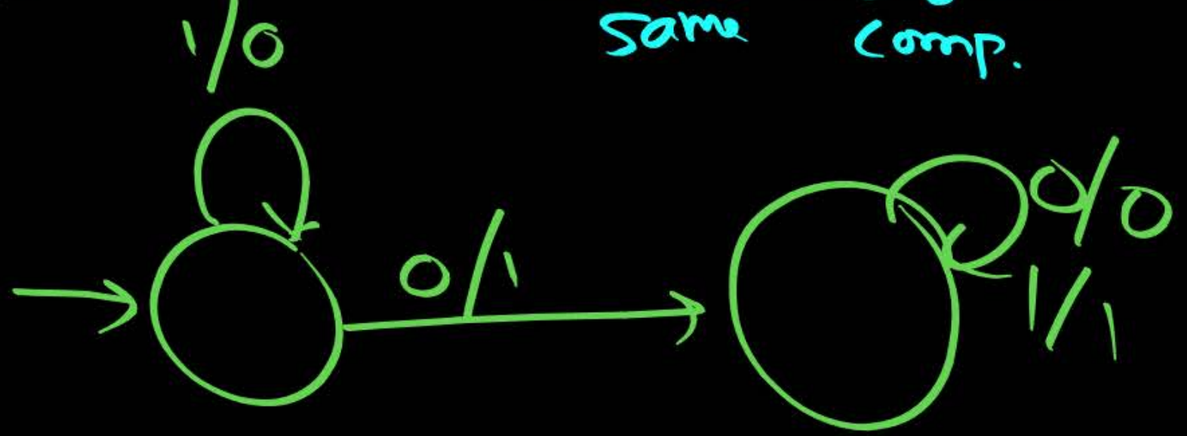


③ Increment of Binary

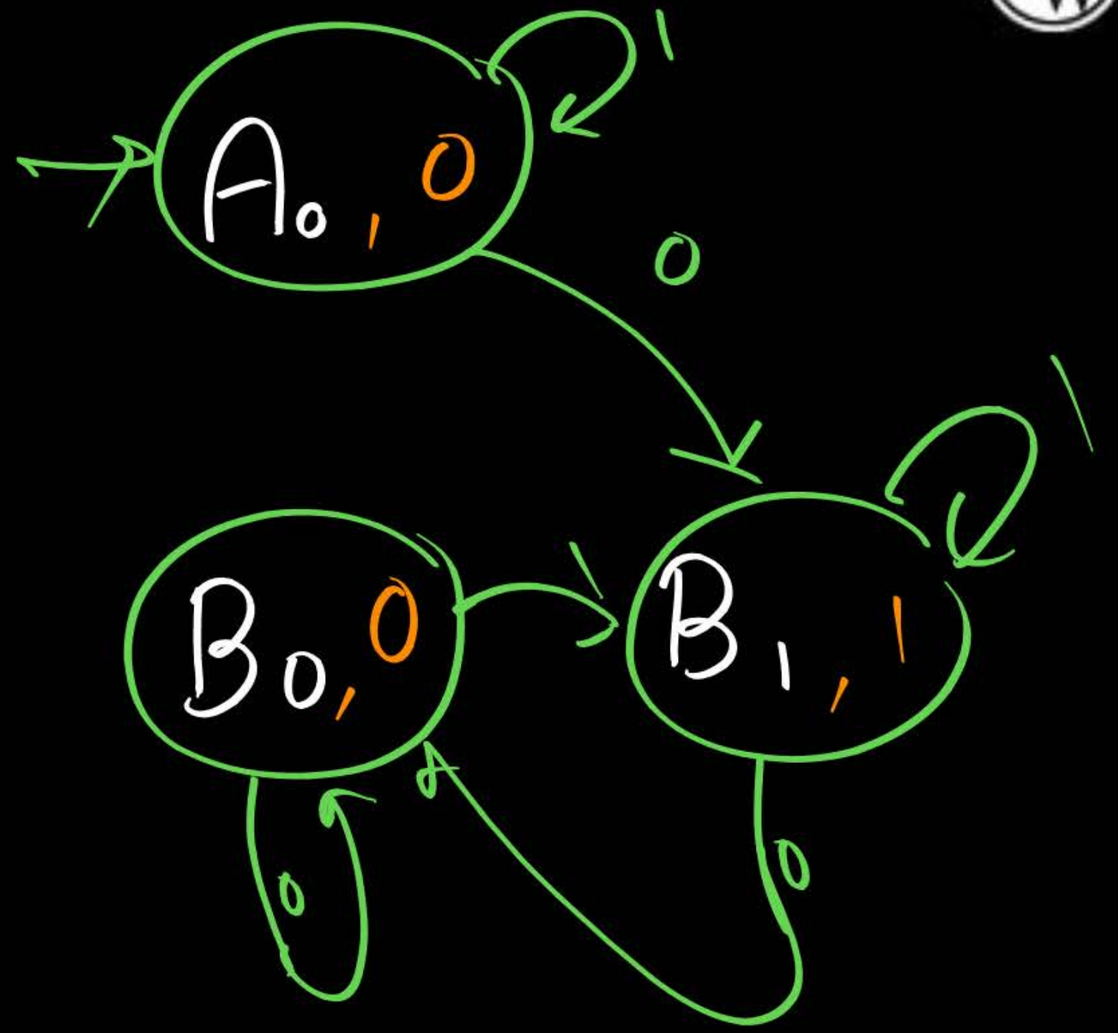
$f(x) = x + 1$



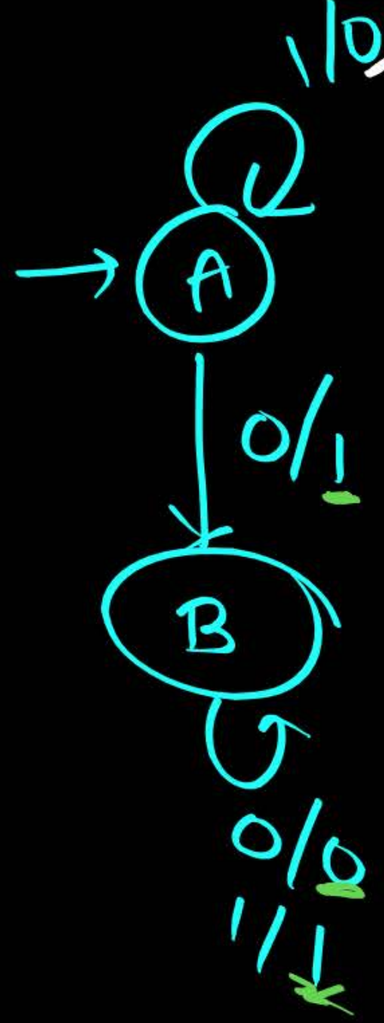


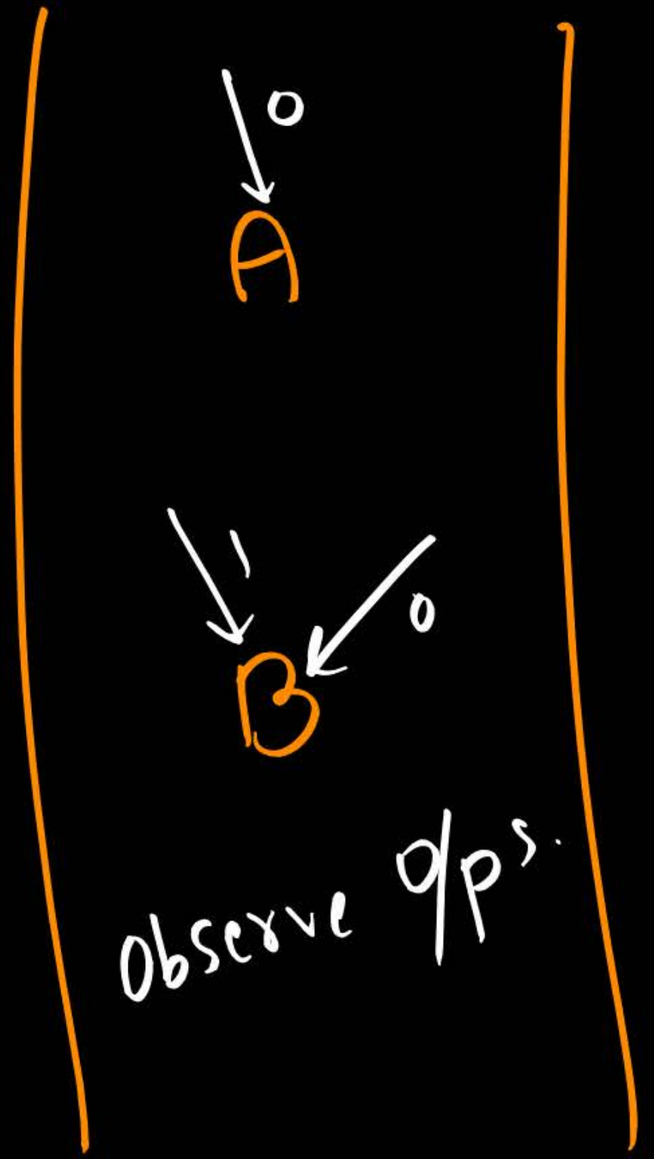


Moore m/c



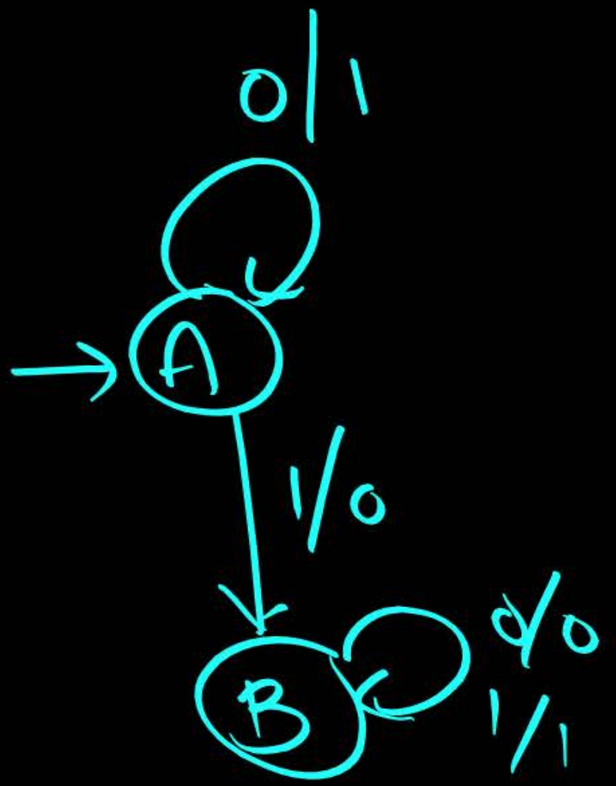
Mealy

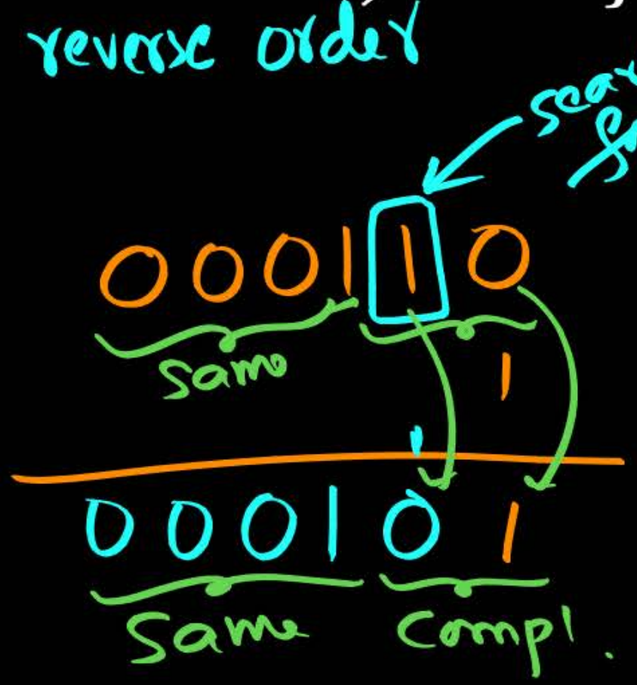




④ Decrement of Binary $f(x) = x-1$

Note: Given i/p should be in reverse order





$0-0=0$

$0-1=1$ (Borrow)

$1-0=1$

$1-1=0$

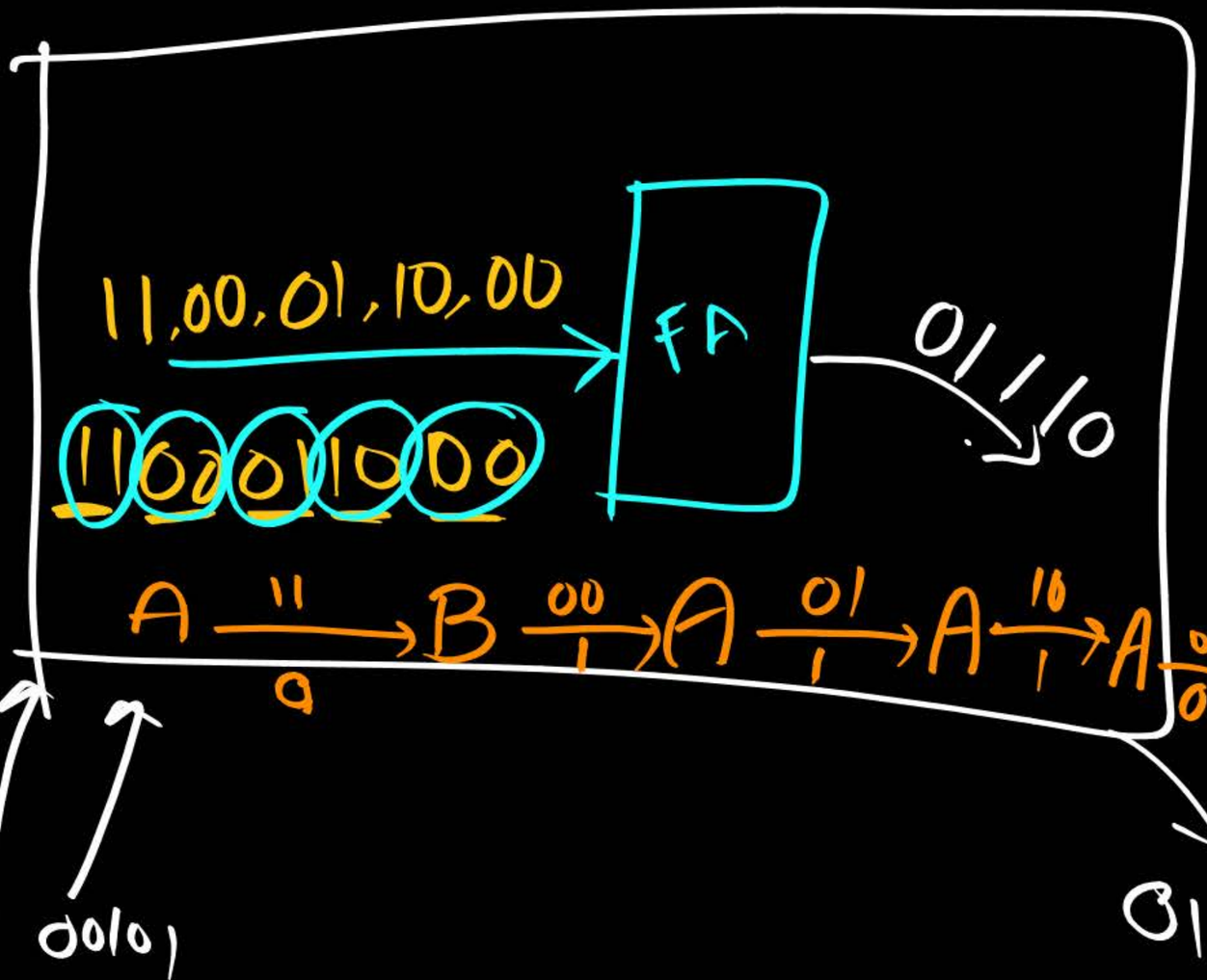
$0+0=0$

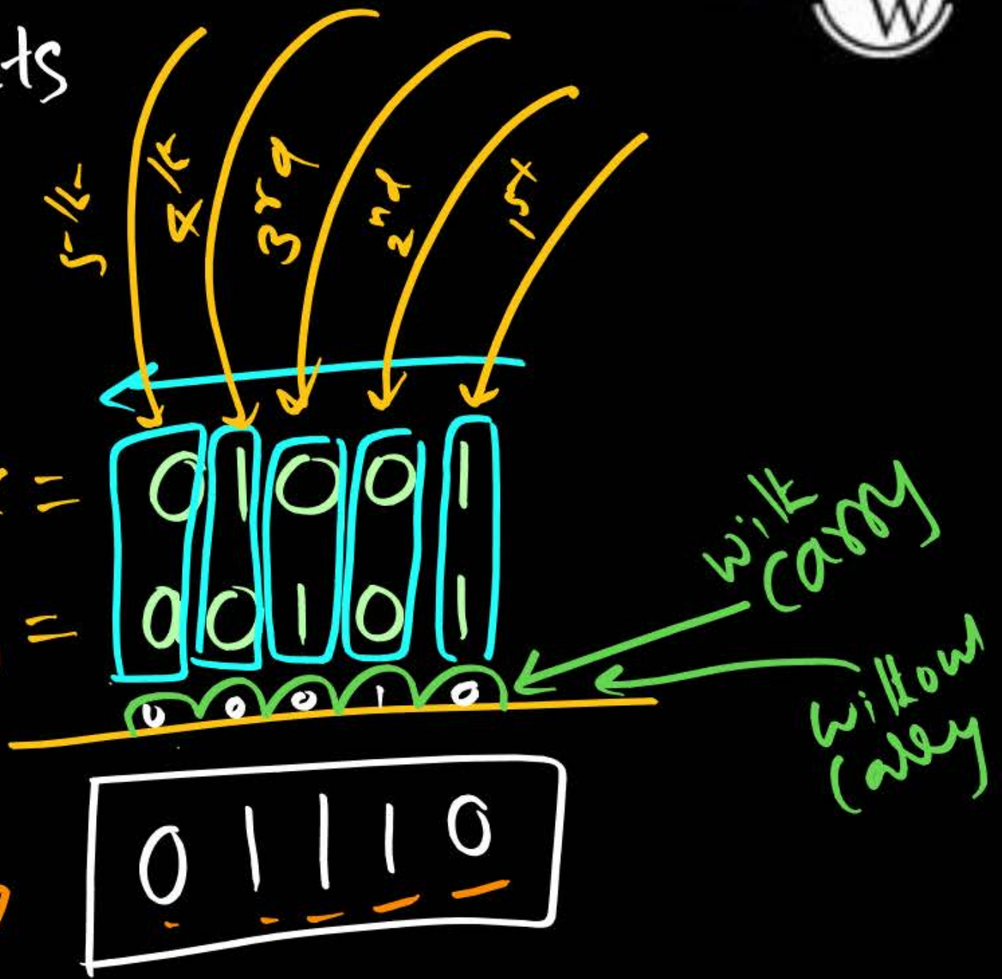
$0+1=1$

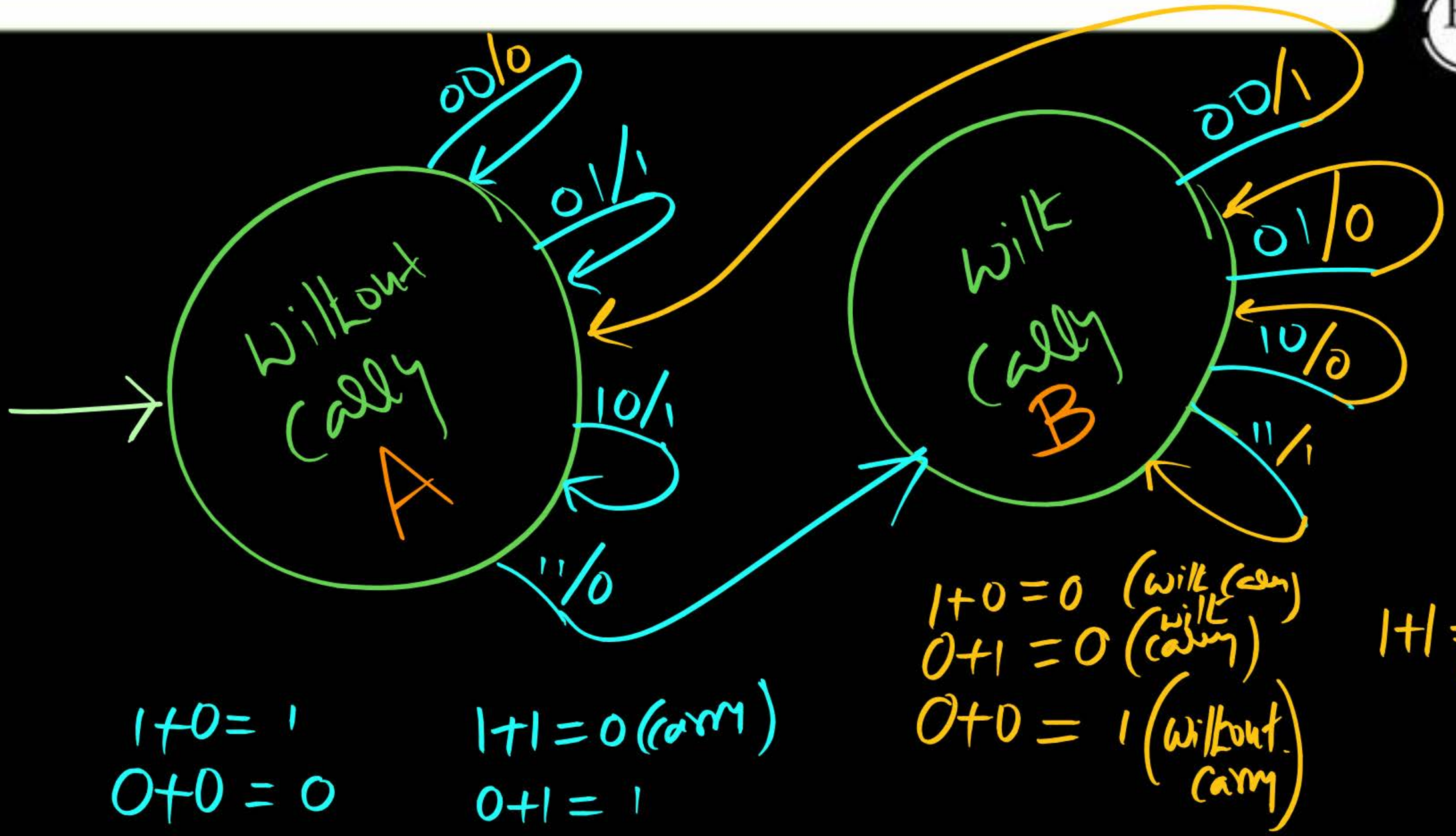
$1+0=1$

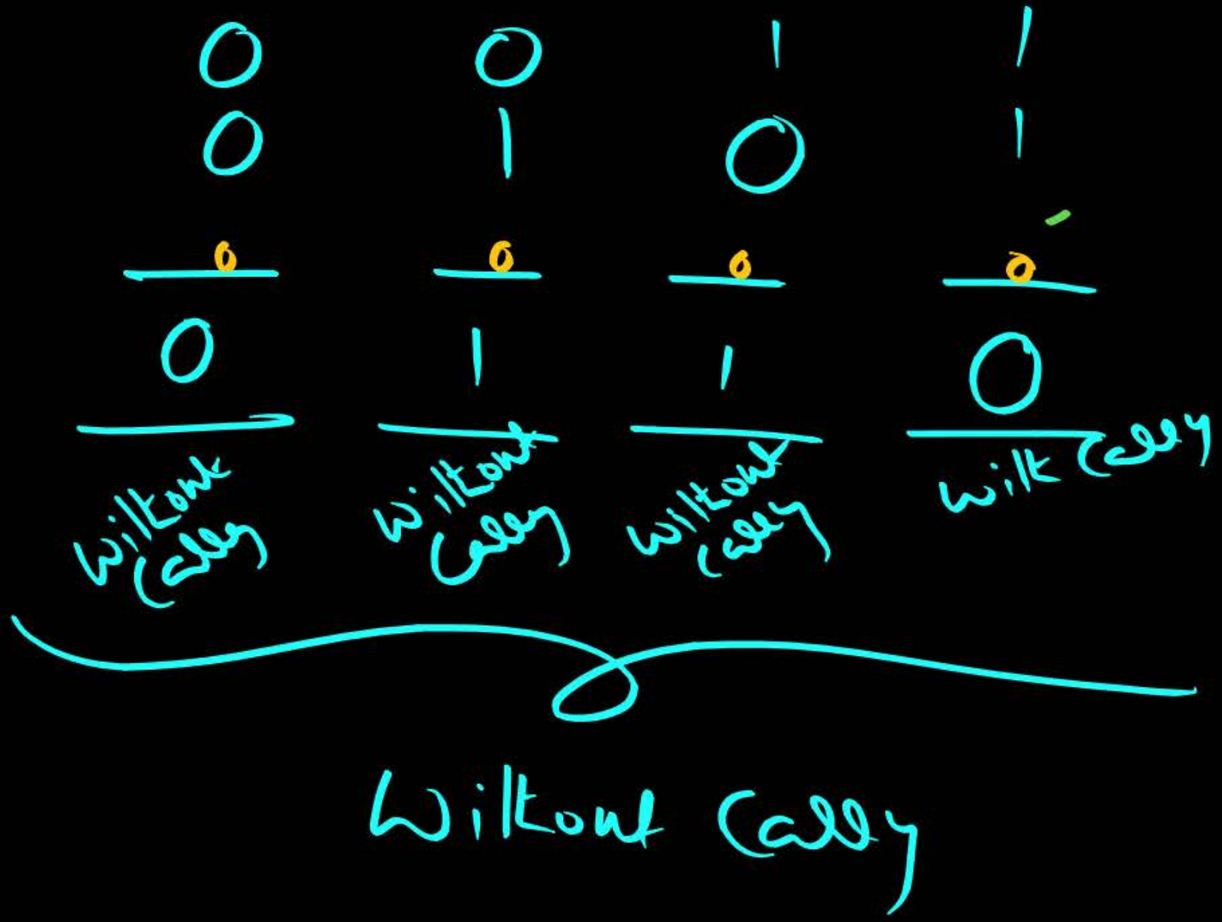
$1+1=0$ (carry)

(5) Addition of 2 Binary inputs

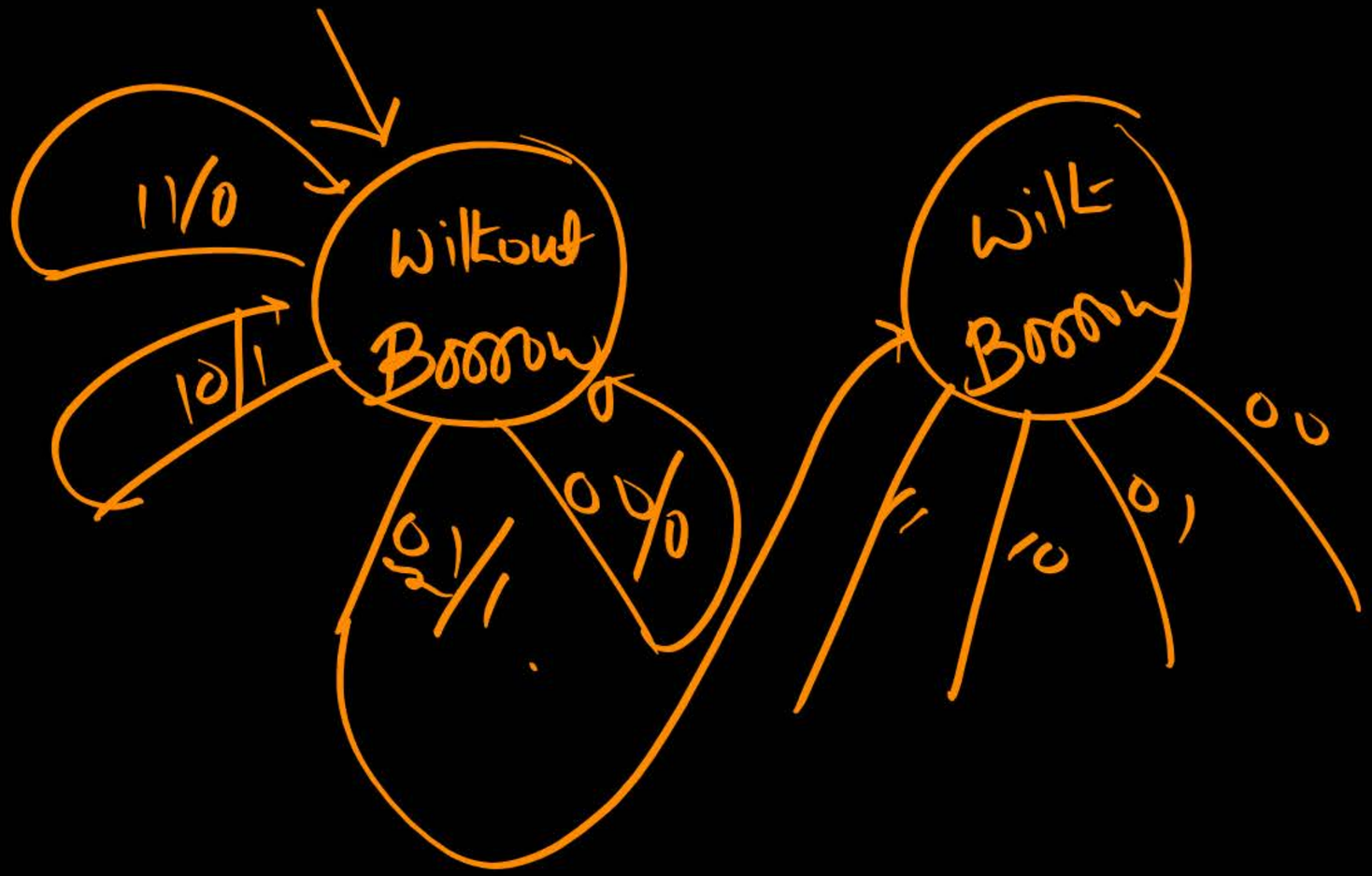





00/0
01/1
10/1
11/0
Without carry A
With carry B
00/1
01/0
10/0
11/1
1+0=1
0+0=0
1+1=0 (carry)
0+1=1
1+0=0 (with carry)
0+1=0 (with carry)
0+0=1 (without carry)
1+1=1 (with carry)


0 0 0
0 1 0
0 0 0
0 1 1
0 0 1
Without carry
1 1 0
1 0 1
With carry
Without carry
With carry

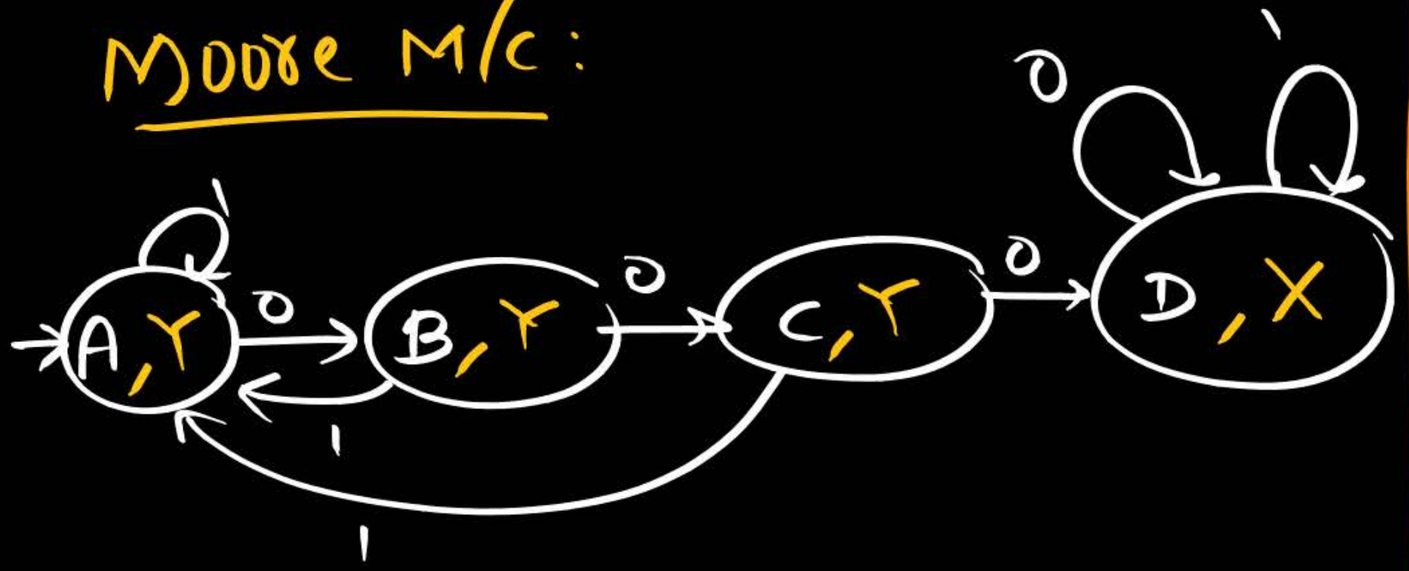
H.W. ⑥ Subtraction of 2 binary inputs :



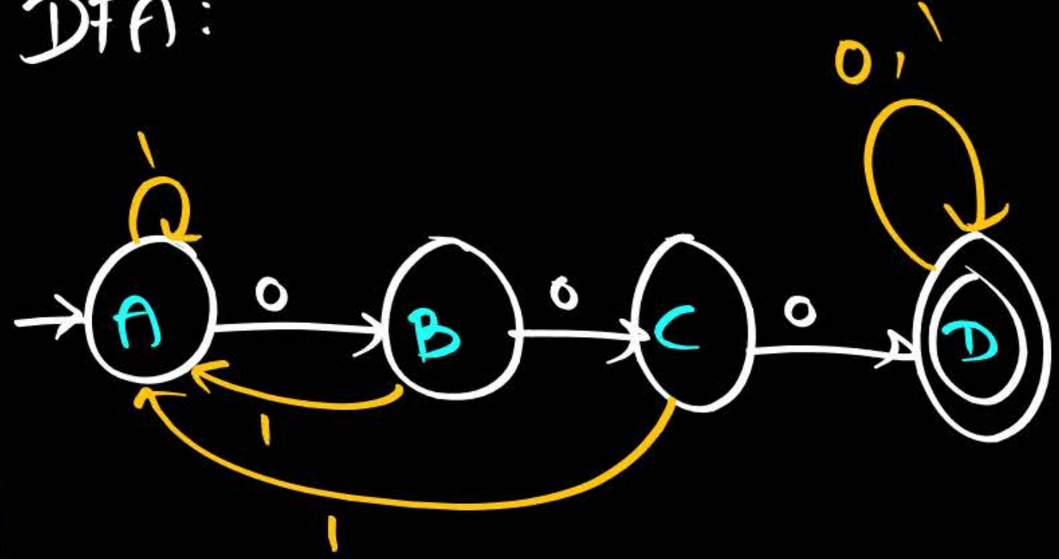
(7) Sequence Detector

Find '000' sequence present or not in the given binary i/p

Moore M/c:



DFA:

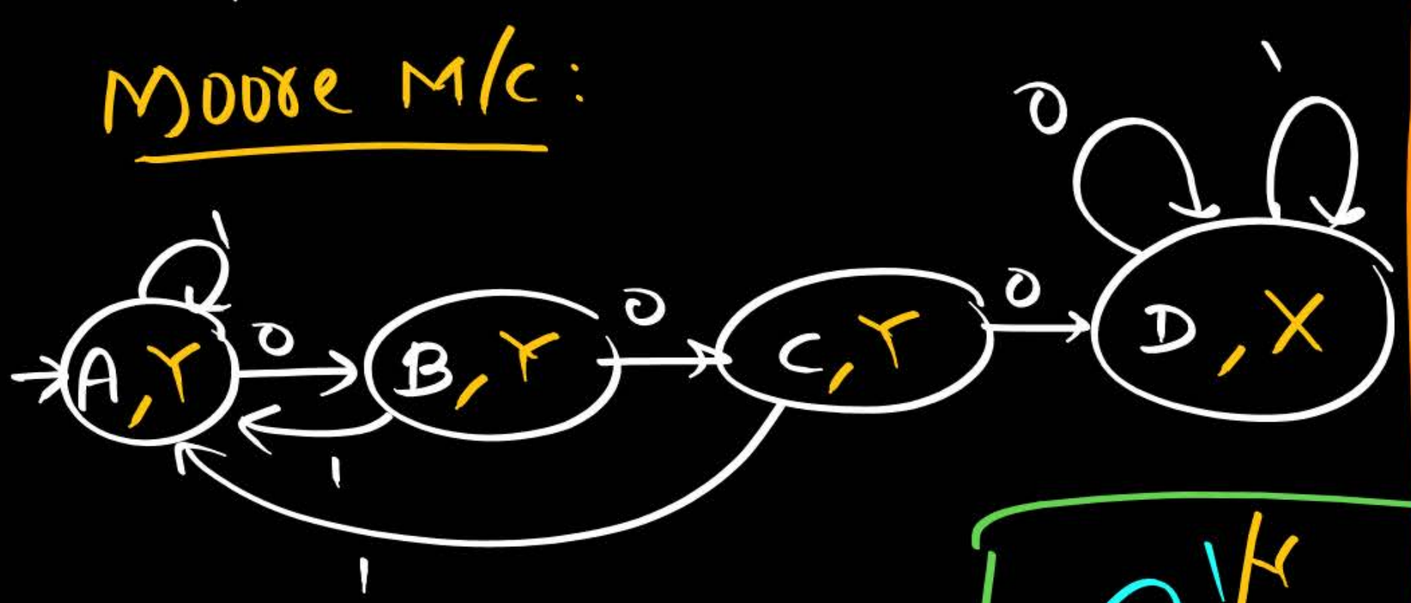


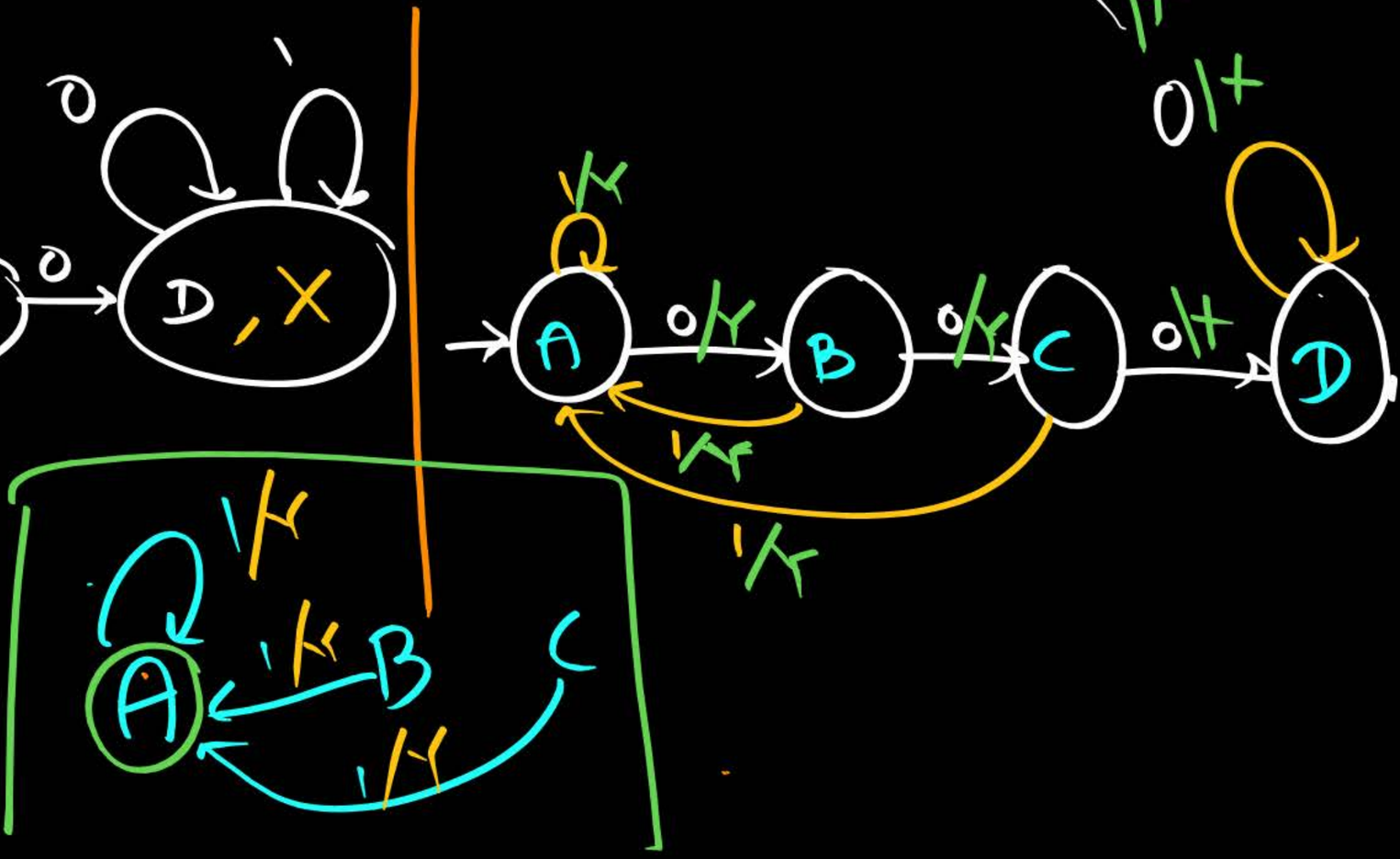
Note: containing '000' as substring ⇒ DFA

Moore m/c ⟹ Mealy m/c

Find incoming transitions at every state and copy the o/p to them

Moore M/c :

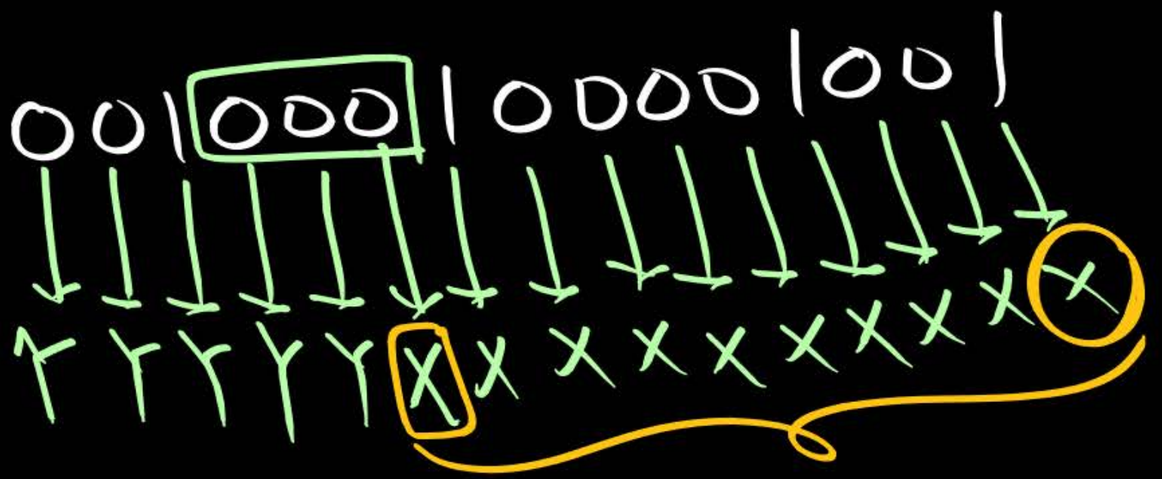




If 000 present, produce X

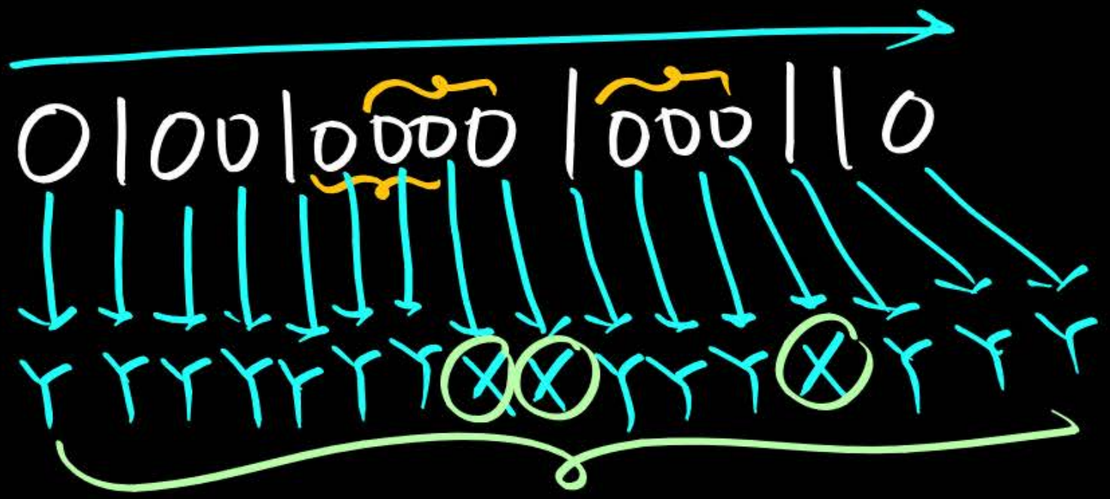
Otherwise, produce Y

I/p : 0010001000001



(8) Find no. of occurrences of '000' in the binary input.

Input : 0 1 0 0 1 0 0 0 0 1 0 0 0 1 1 0



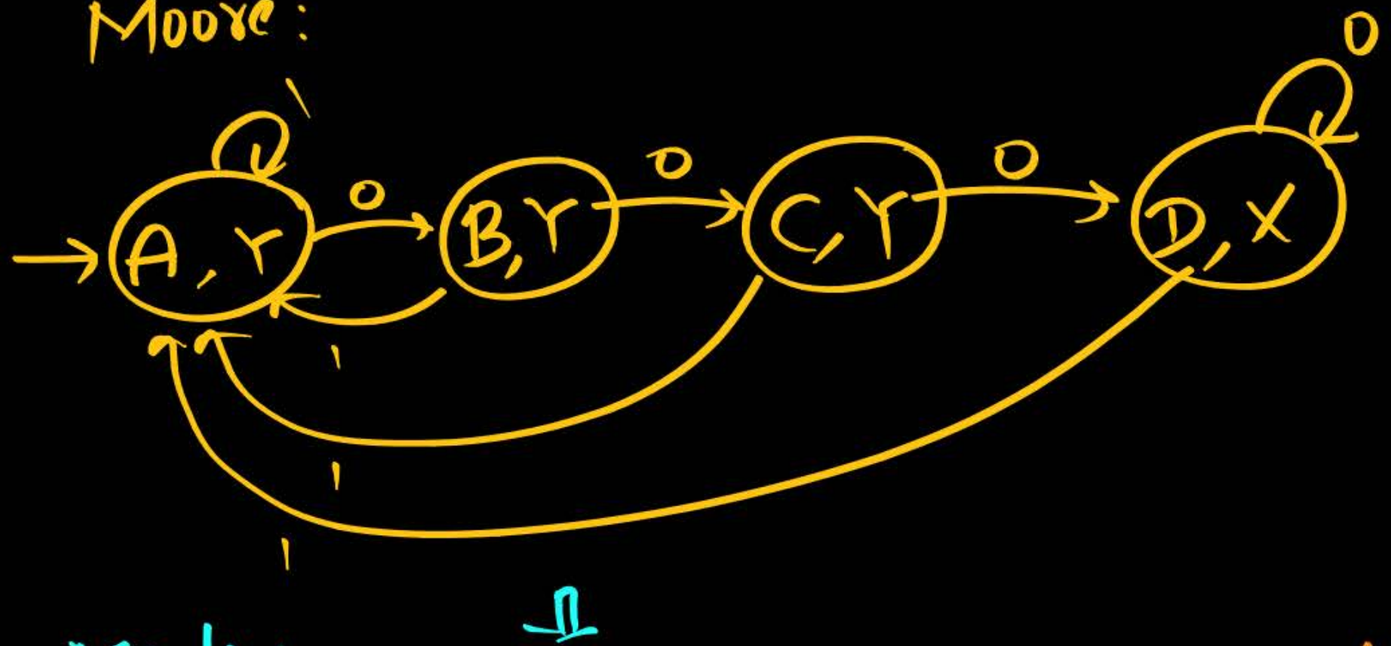
o/p : r r r r r r r r x x r r r x r r r r

If 000 occurs, produce x
otherwise produce r

3 times

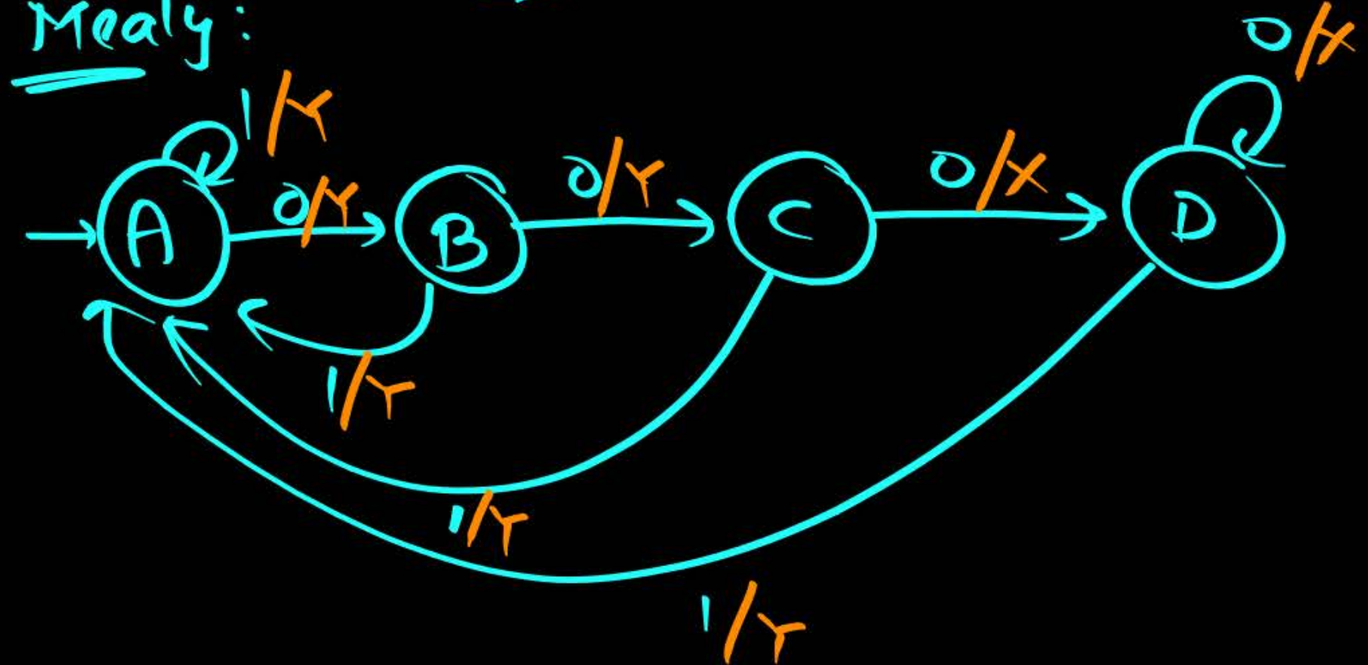
Note: Ending with '000' ⇒ DFA

Moore :

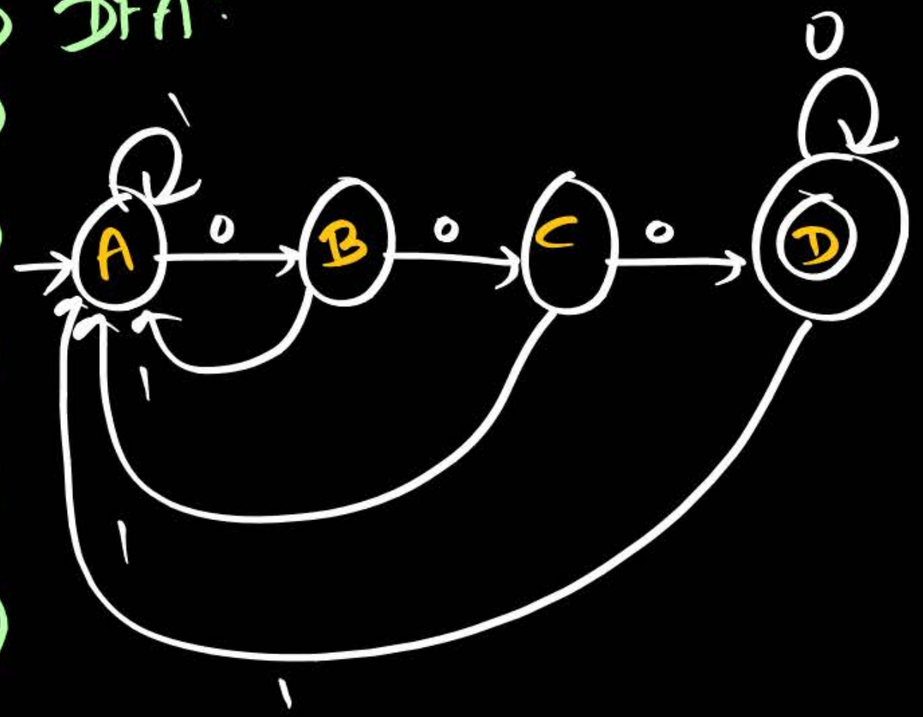


≡

Mealy :



DFA :



H.W (9) produce the sum of present bit and previous bit of input.

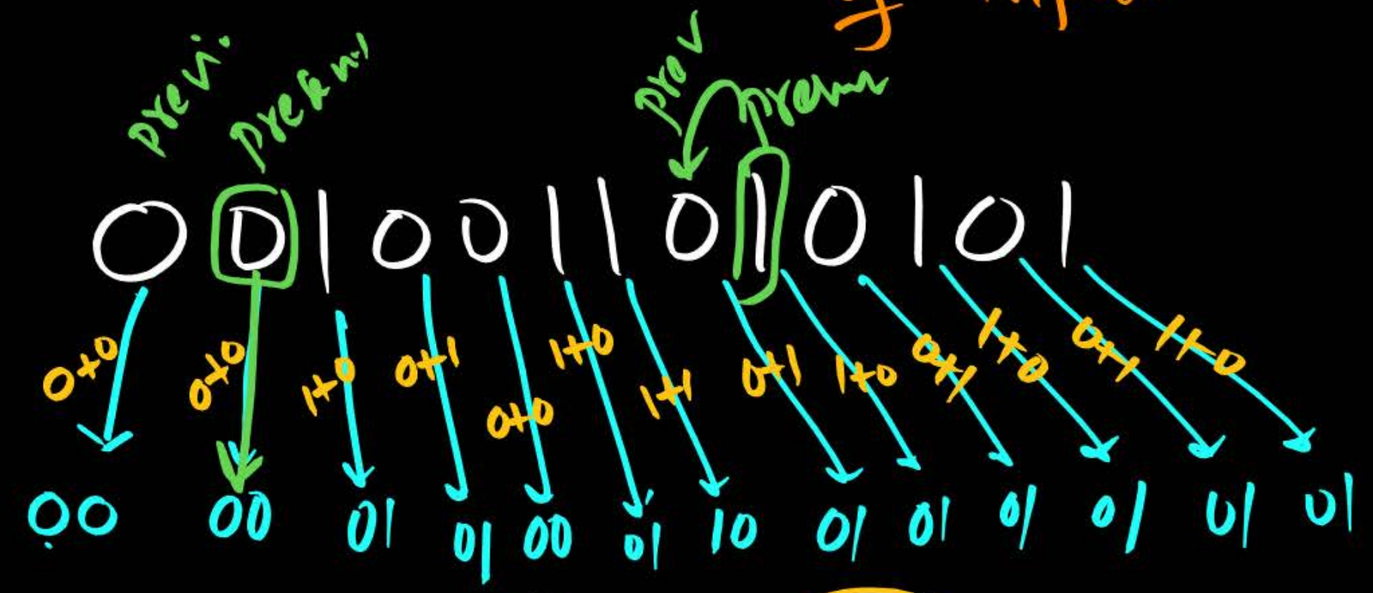
0+0=00

0+1=01

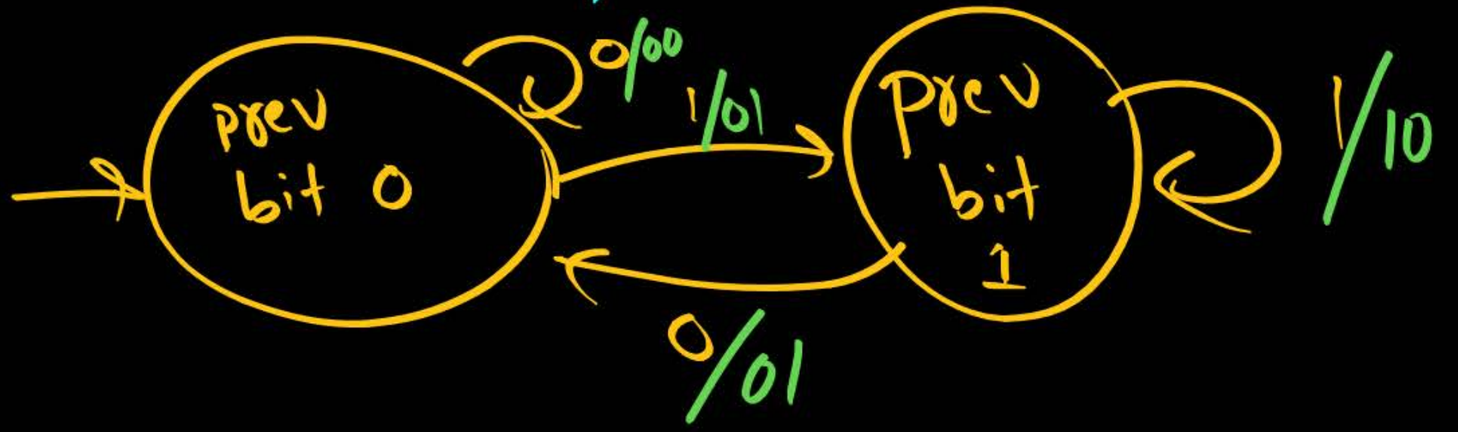
1+0=01

1+1=10

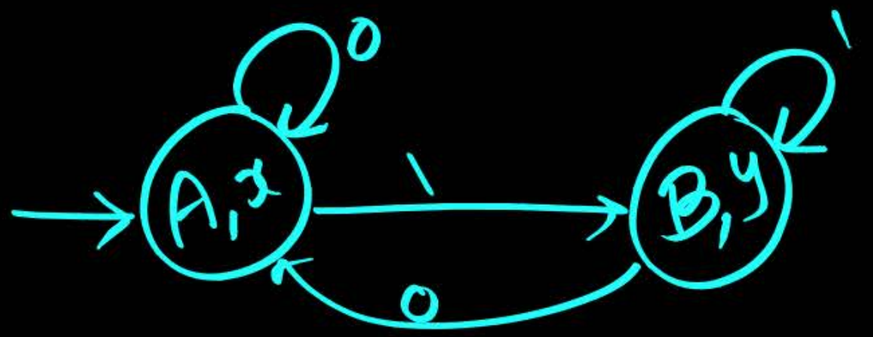
I/p : 0 0 1 0 0 1 1 0 1 0 1 0 1



O/p : 00 00 01 01 00 01 10 01 01 01 01 01 01

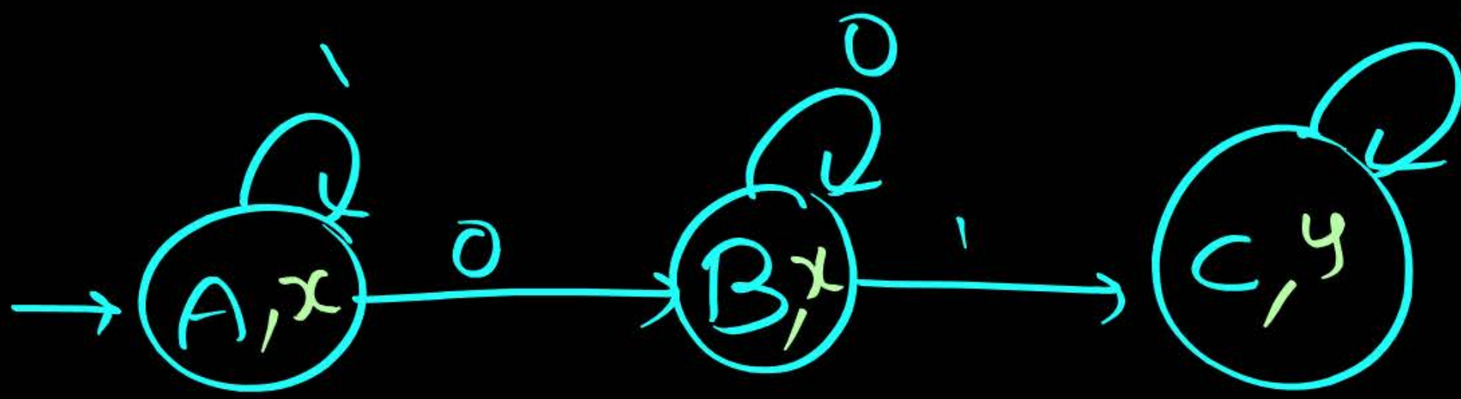


(1)

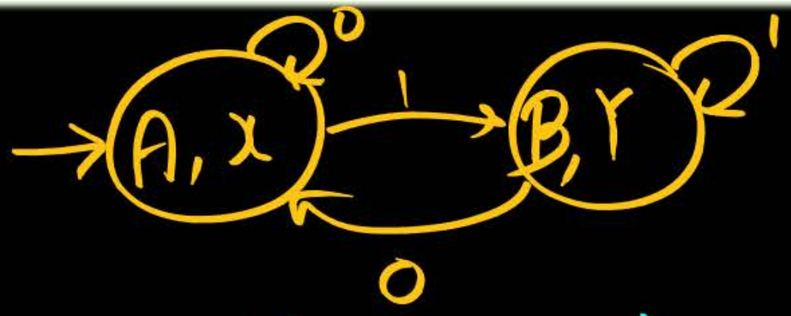


⇒ Find the functionality.

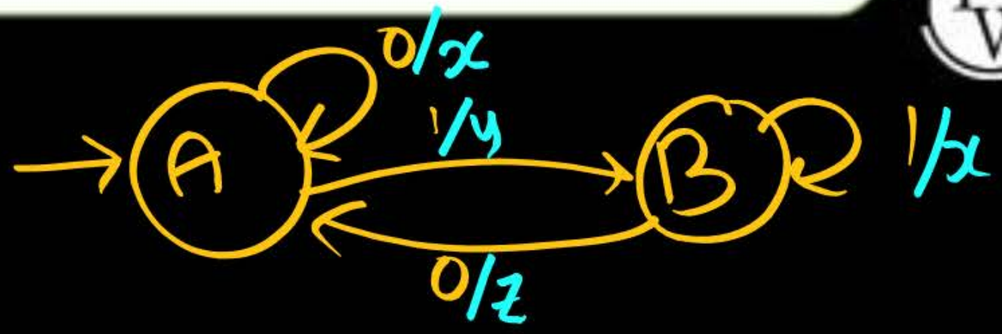
(2)



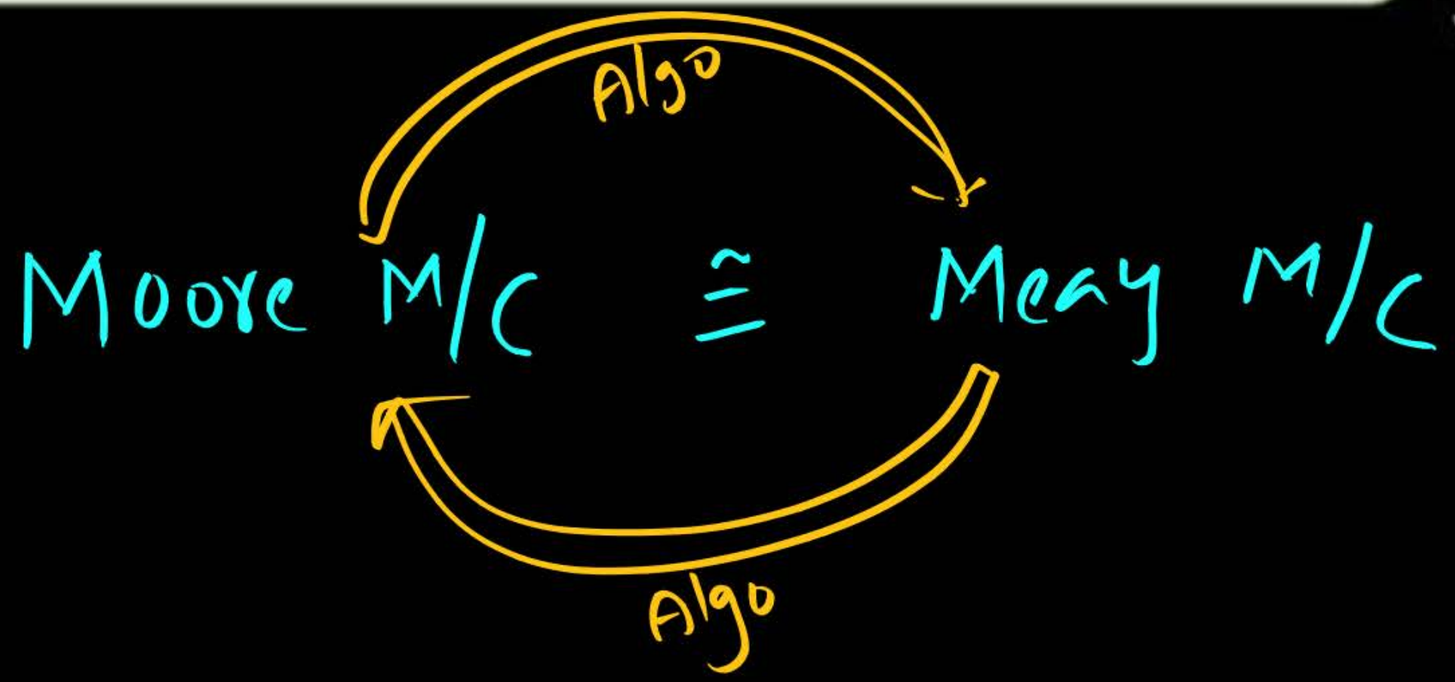
Find the functionality



Q	δ	0	1	λ (o/p)
→	A	A	B	x
	B	A	B	y



δ, λ	0		1	
	NS	o/p	NS	o/p
→ A	A	x	B	y
B	A	z	B	x

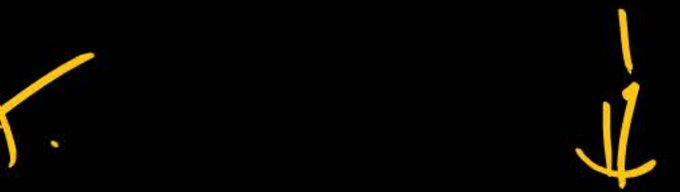

Algo
Moore M/C ≅ Mealy M/C
Algo

Summary

- Moore M/C
- &
- Mealy M/C

$R_1 = a^*$

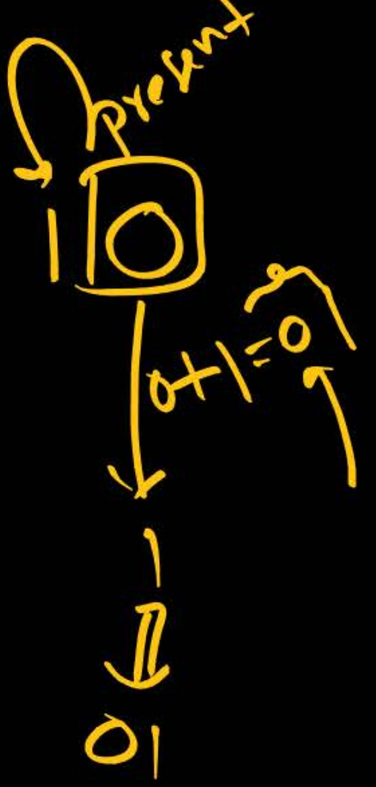
$R_2 = (aa)^*$



A.

B.

C.




THANK YOU
GW
SOLDIERS !