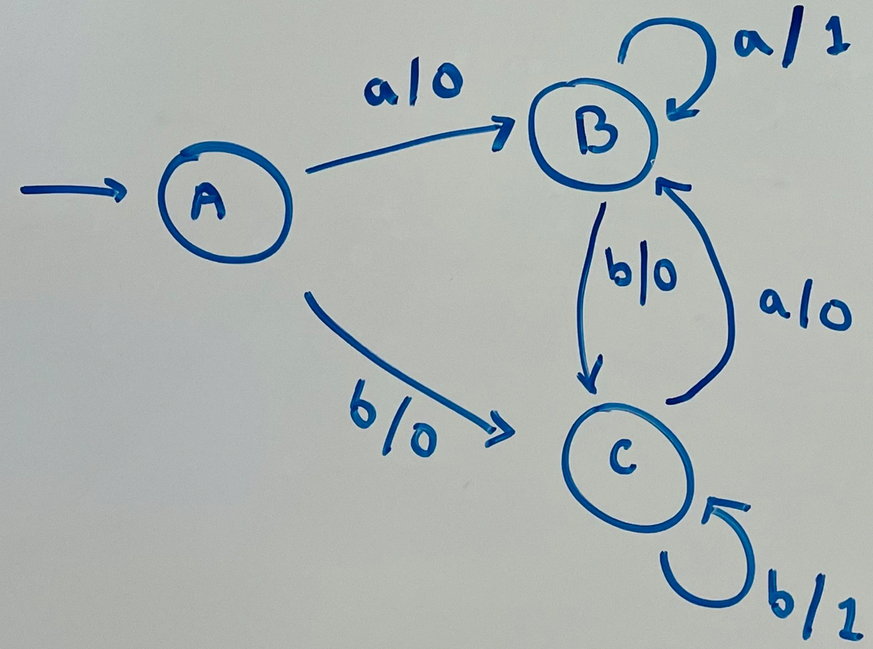
Mealy Machine

★ Example 3

Design a Mealy Machine accepting the language consisting of strings from Σ^*, where $\Sigma = \{a, b\}$ and the strings contain either 'aa' or 'bb'.

aa – 1

bb – 1



abb

001

aababb

010001

(*) bbb

011

* Example 4

Construct a Mealy Machine that gives 2's Complement of any binary input. (Assume that the last carry bit is neglected)

2's complement : 1's complement + 1

Eg: 10100

MSB ← LSB

1's compl... : 01011

+ 1

2's complement : 01100

10100

1's comp: 00011

+ 1

00100

1111

1's comp: 0000

+ 1

2's comp: 0001

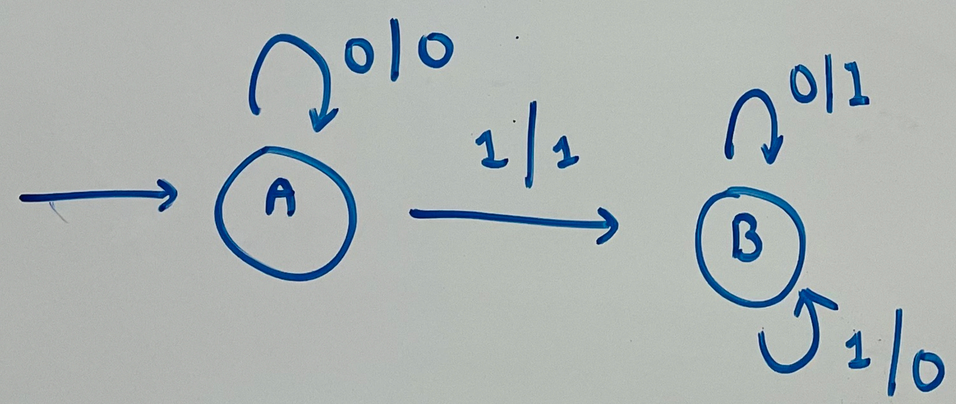
A+1
0
0

MSB ← LSB

10100

B ← B ← B ← A ← A ← A

0 1 1 0 0



ne that gives 2's Complement of any
the last carry bit is neglected)

1's complement + 1

```
 1)1 00
 00 1 1
      + 1
 0 0 1 0 0
```

```
(*) 1 1 1) 1
1's comp:  0 0 0 0
             + 1
2's comp:  0 0 0 1
```

MSB ← LSB

```
 1 0)1 0 0
 B B B A A A
 0 1 1 0 0
```

A+B	Sum	Carry
0+0	0	0
0+1	1	0
1+0	1	0
1+1	0	1

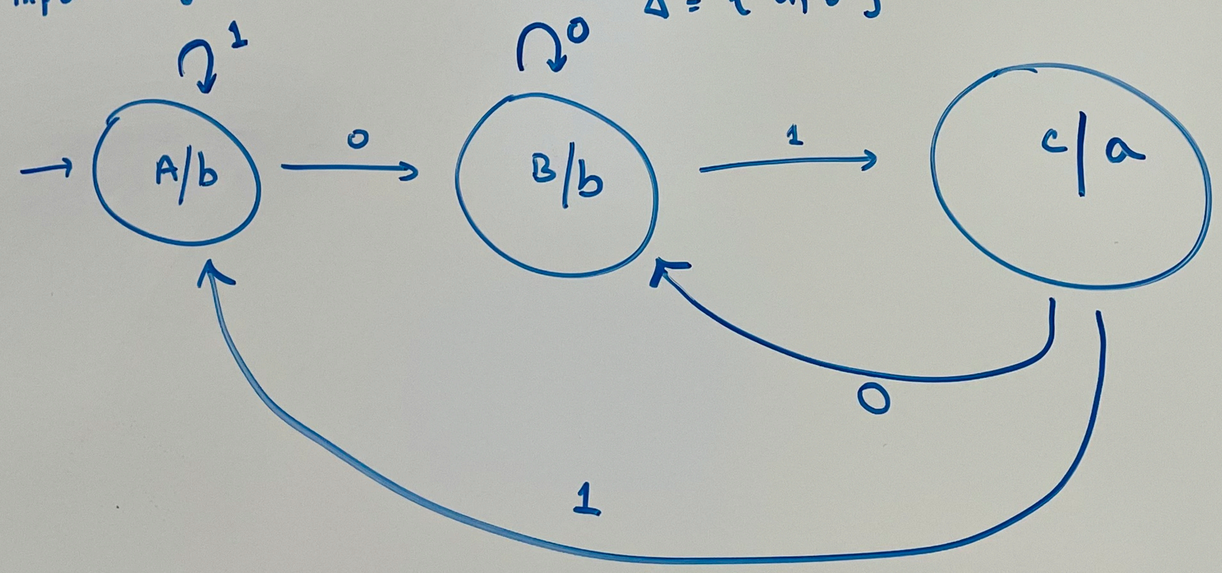
Moore Machine

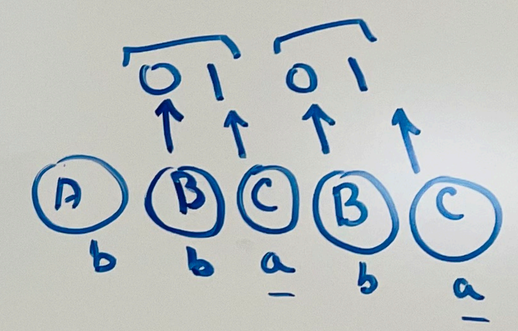
*** Example 1**

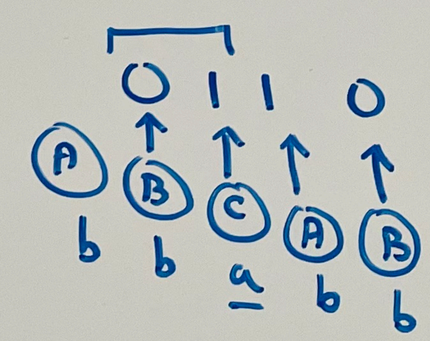
Construct a Moore Machine that prints '0' whenever the sequence '01' is encountered in any input string.

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

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







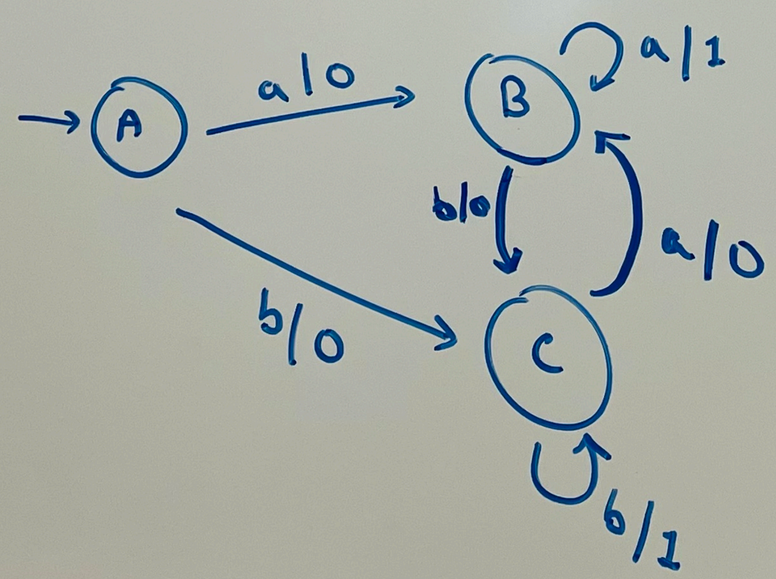
Mealy Machine

★ Example - 3

Design a Mealy Machine accepting the languages consisting of strings from Σ^*, where $\Sigma = \{a, b\}$ and the strings should contain either 'aa' or 'bb'.

aa - 1

bb - 1



(*) abb

001

(*) aaa

011

(*) aab

010

(*) aababb

010001

★ Example 4

Construct a Mealy Machine that gives 2's Complement of any binary input. (Assume that the last carry bit is neglected)

2's complement = 1's complement + 1

Eg: MSB ← LSB

1 0 1 0 0

1's comp: 0 1 0 1 1

+ 1

2's comp: 0 1 1 0 0

Eg: 1 1 1 0 0

1's comp: 0 0 0 1 1

+ 1

2's comp: 0 0 1 0 0

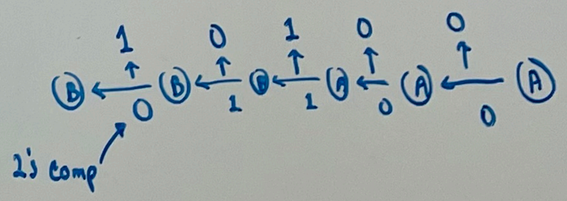
Eg: 1 1 1 1

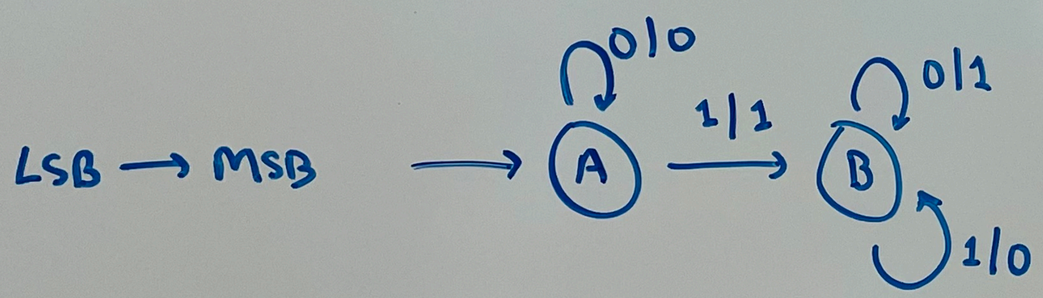
1's Comp: 0 0 0 0

+ 1

2's comp: 0 0 0 1

A + B	Sum	Carry
0 + 0	0	0
0 + 1	1	0
1 + 0	1	0
1 + 1	0	1



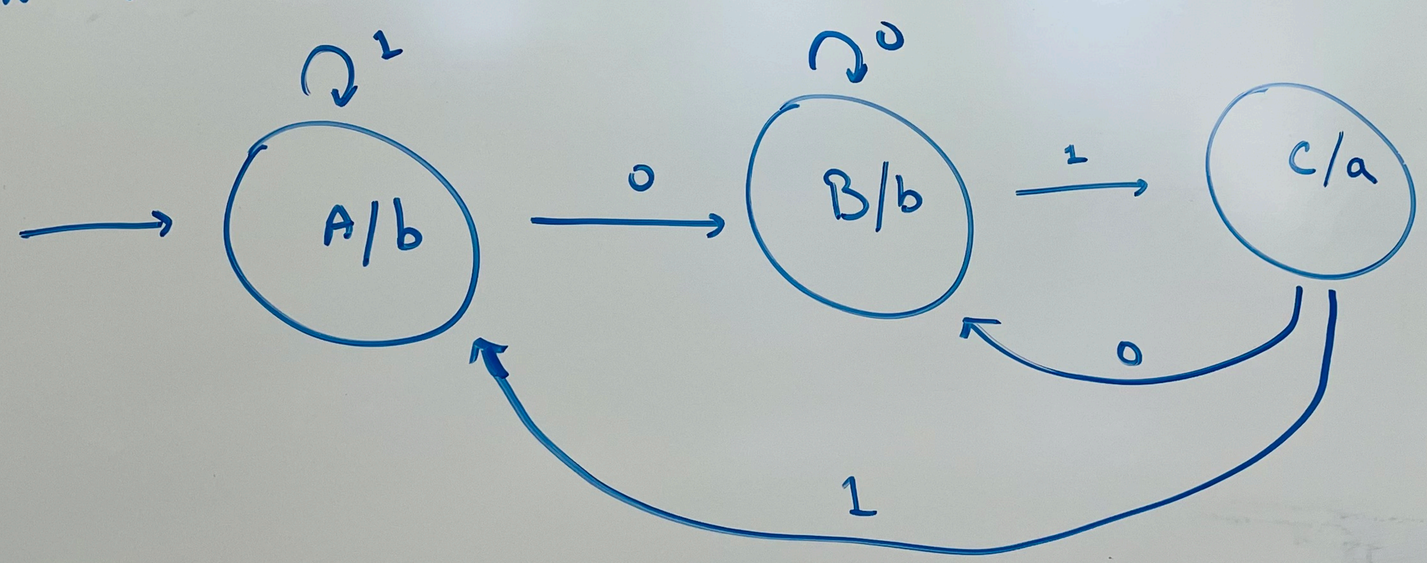


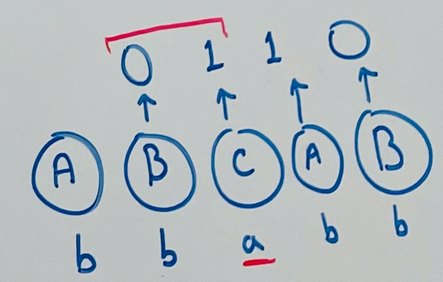
★ Moore Machine

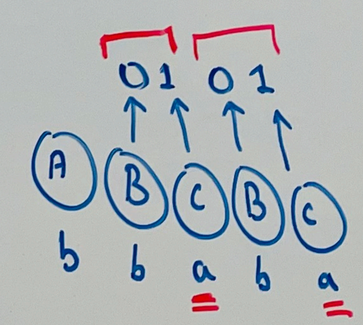
★ Example 1 Construct a Moore Machine that prints 'a' whenever the sequence '01' is encountered in any input string.

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

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

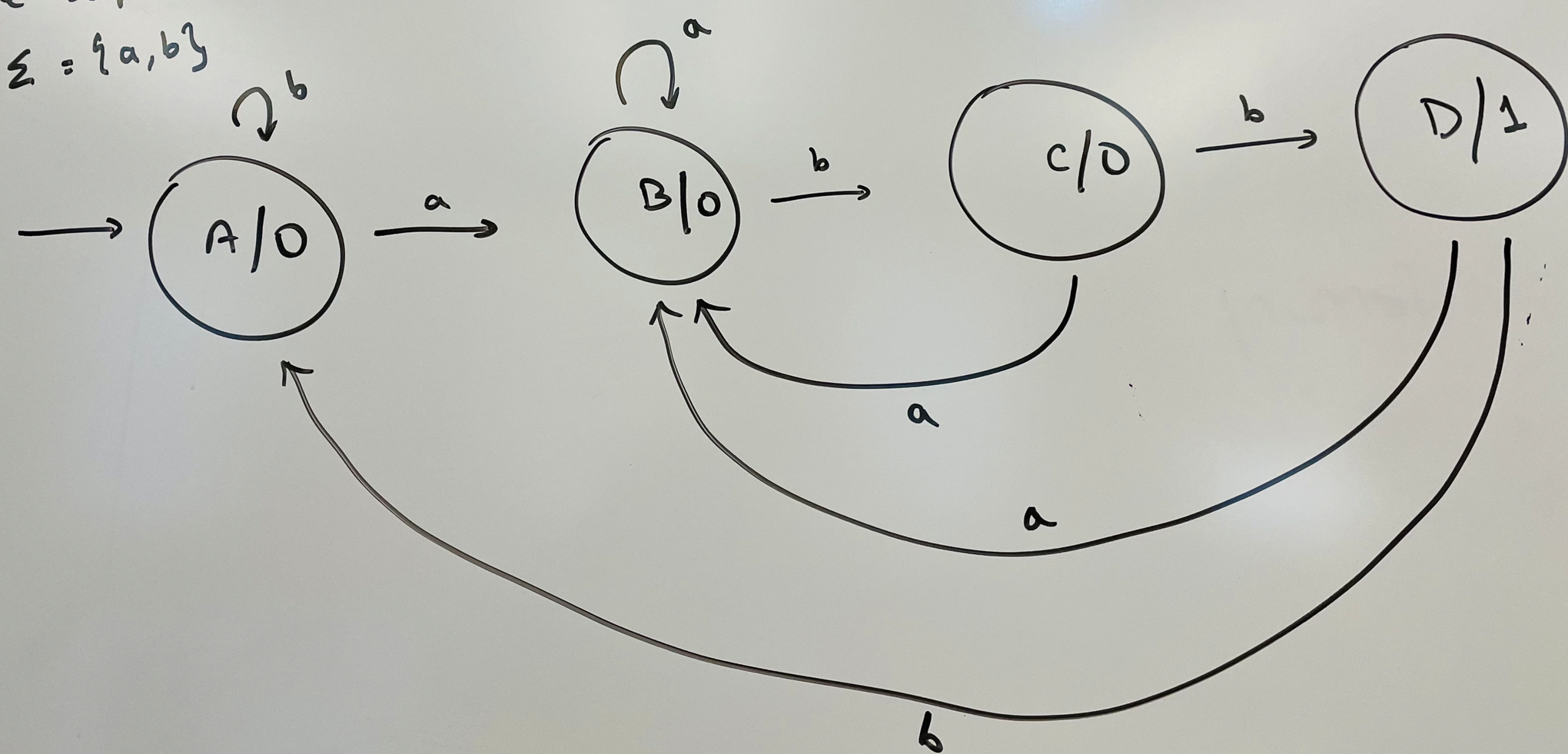






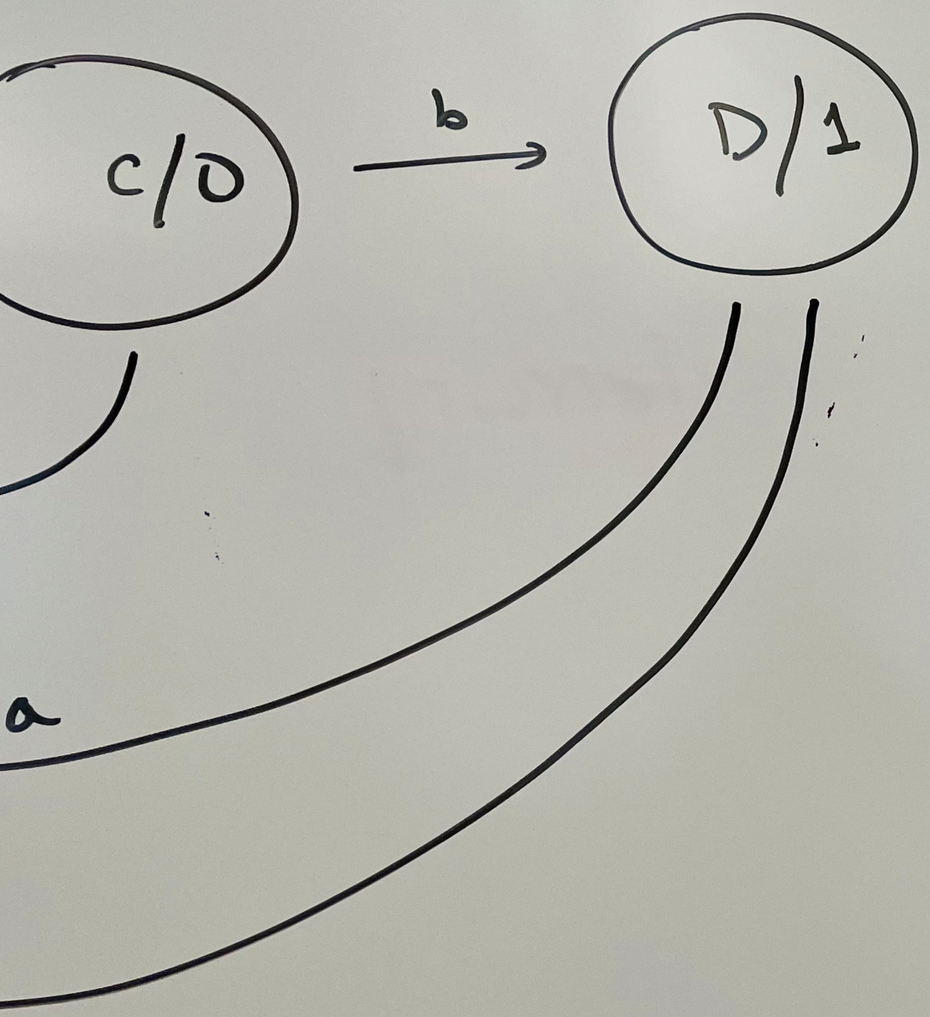
Moore Machine

★ Example 2 Construct a Moore Machine that counts the sequence 'abb' in any input string over $\Sigma = \{a, b\}$



s

over



Input: a b b

States: A B C D

Output: 0 0 0 1

Input: a b b a b b

States: A B C D B C D

Output: 0 0 0 1 0 0 1

* Example 3

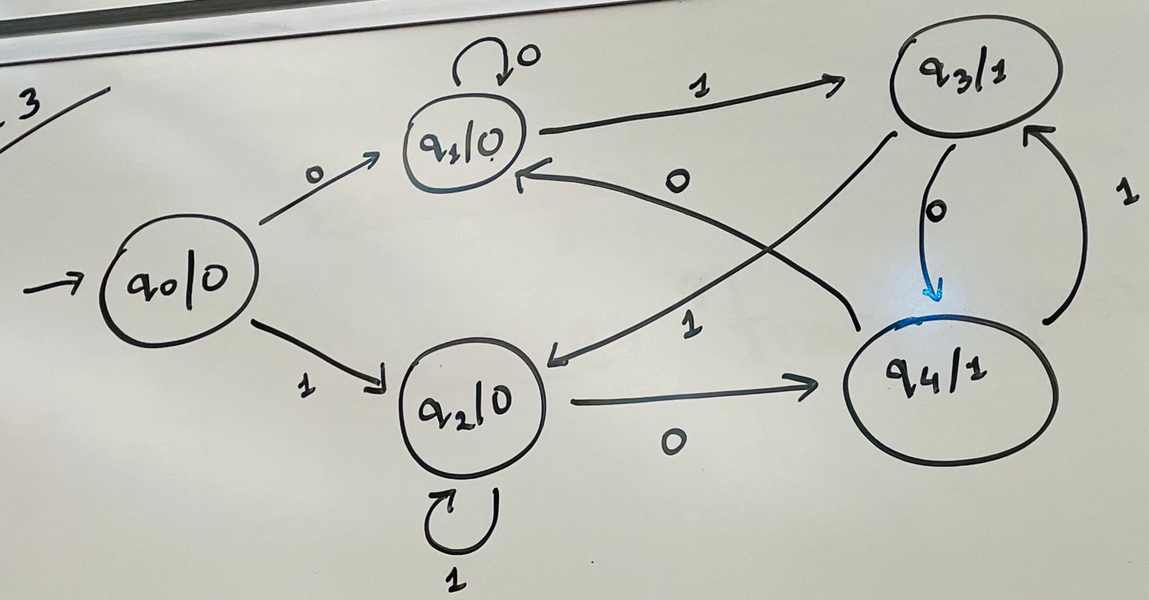
C D

0 1

B C D

0 0 1

* Example 3



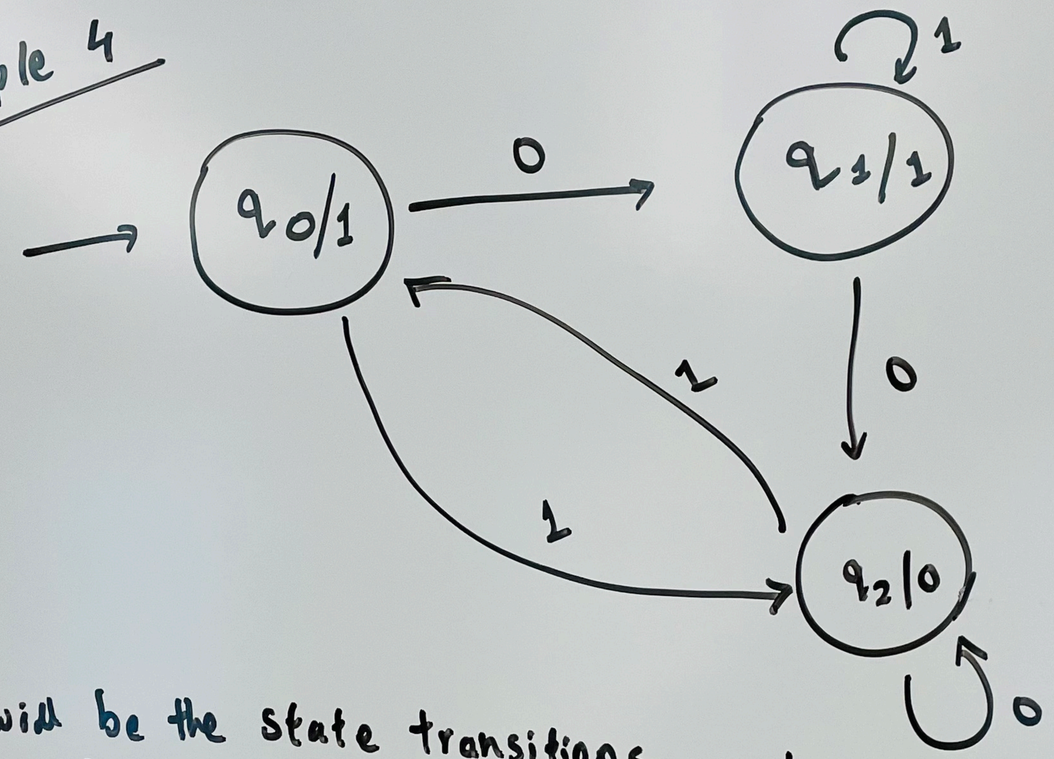
Input: 11

What will be the State transitions and outputs for this Moore Machine?

States: q_0 q_2 q_2

Output: 0 0 0

★ Example 4

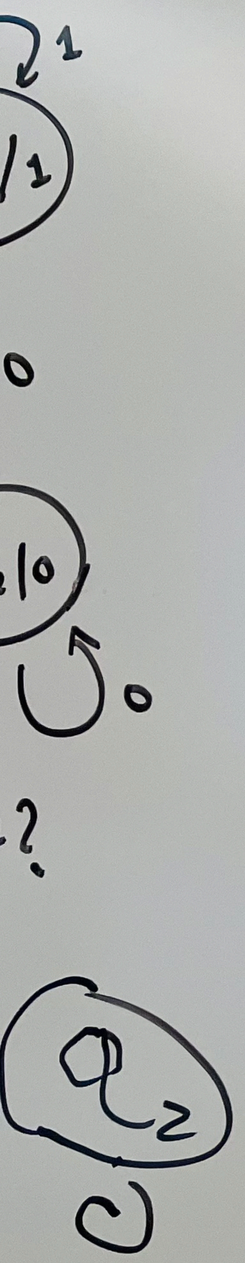


What will be the state transitions and output for the following Moore Machine?

Input : 0 1 0

States: q_0 q_1 q_1 q_2

output: 1 1 1 0



★ Example 5

States	a	b	Outputs
→ q_0	q_1	q_2	0
q_1	q_1	q_3	0
q_2	q_3	q_4	1
q_3	q_4	q_4	0
q_4	q_0	q_0	0

Run the following inpu

(a) a a b a b

States: q_0 q_1 q_1

Output: 0 0 0

(b) a b a b

States: q_0 q_1

Output: 0 0

b	Outputs
q_2	0
q_3	0
q_4	1
q_4	0
q_0	0

Run the following input sequences and find the respective output:

(a) a a b a b

States: q_0 q_1 q_1 q_3 q_4 q_0

Output: 0 0 0 0 0 0

(b) a b a b b

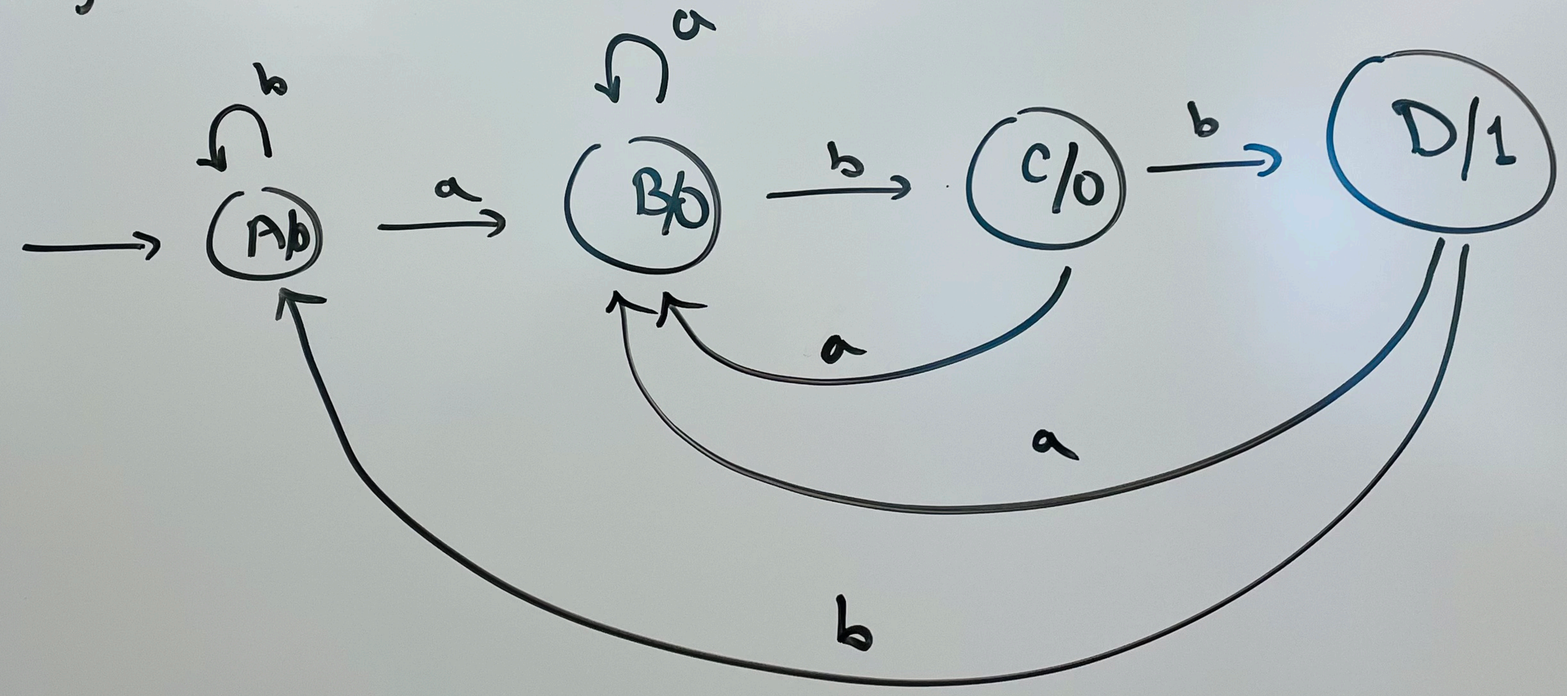
States: q_0 q_1 q_3 q_4 q_0 q_2

Output: 0 0 0 0 0 1

Moore Machine

★ Example 2

Construct a Moore Machine that counts the occurrences of the sequence 'abb' in any input string over $\Sigma = \{a, b\}$



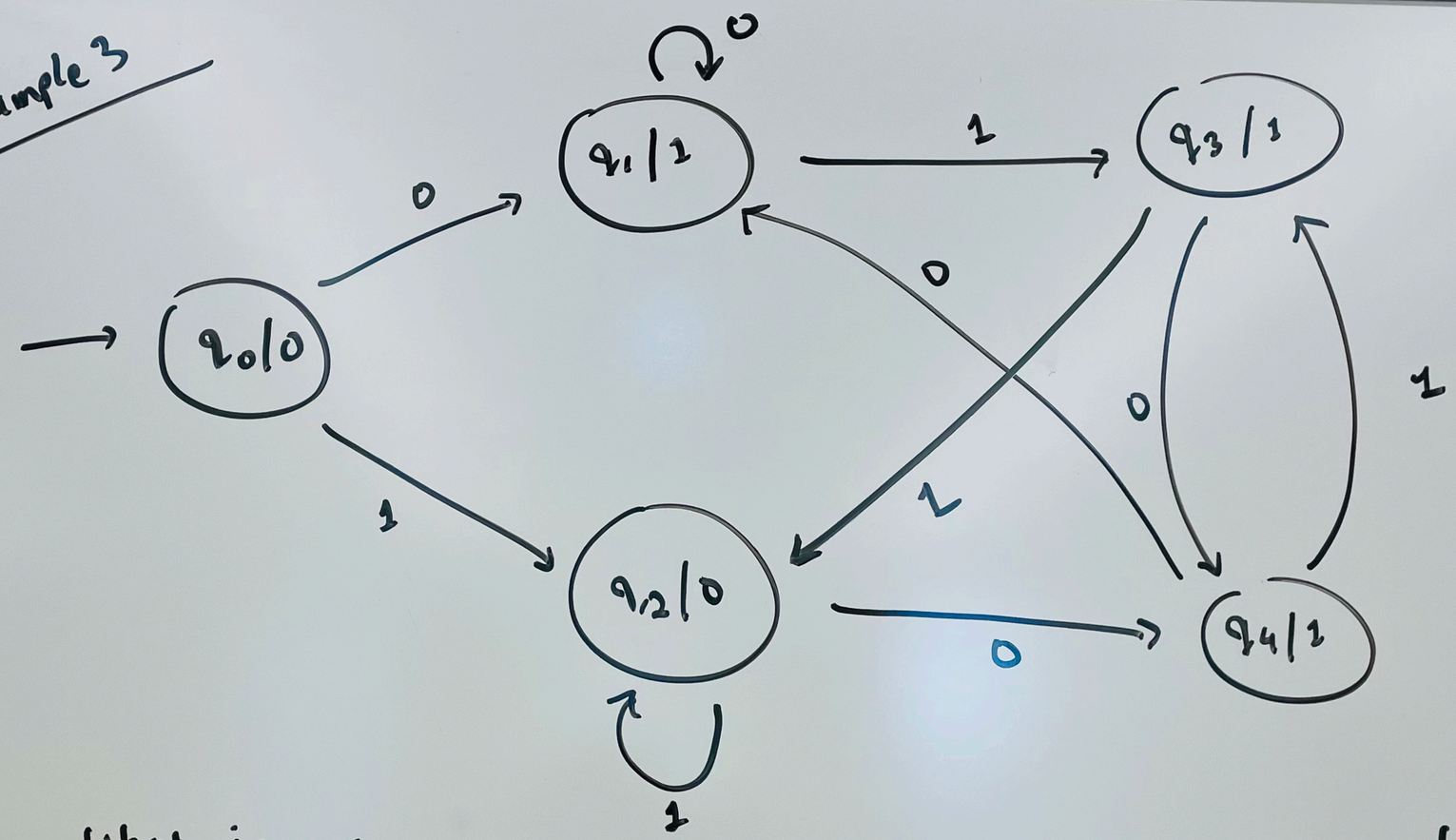
abb

States:	A	B	C	D
Output:	0	0	0	1

abbabb

States:	A	B	C	D	B	C	D
Output:	0	0	0	1	0	0	1

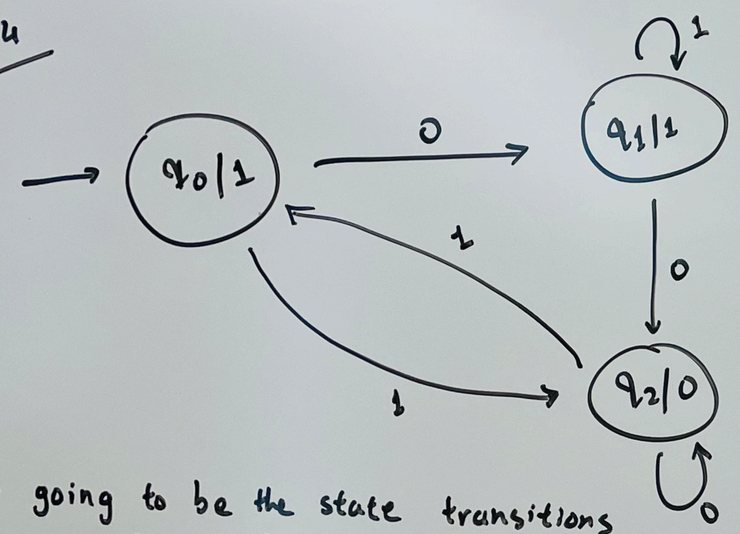
* Example 3



What is going to be the state transitions and output for the input: 11 ?

States:	q_0	q_2	q_2
Output:	0	0	0

★ Example 4



What is going to be the state transitions and outputs for the following input : 0102.

States: q_0 q_1 q_1 q_2

Output: 1 2 1 0

* Example 5

States	a	b	Outputs
→ q_0	q_1	q_2	0
q_1	q_2	q_3	0
q_2	q_3	q_4	1
q_3	q_4	q_4	0
q_4	q_0	q_0	0

Run the following input sequences respective outputs:

(a) input: a a b a b

States: q_0 q_1 q_2 q_4

Outputs: 0 0 1 0

(b) a b b b

States: q_0 q_1 q_3 q_4 q_0

Output: 0 0 0 0 0

Run the following input sequences and find the respective outputs:

(a) input: a a b a b

States:	q_0	q_1	q_2	q_4	q_0	q_2
Outputs:	0	0	1	0	0	1

(b) a b b b

States:	q_0	q_1	q_3	q_4	q_0
Output:	0	0	0	0	0

(c) a b a b b

States:	q_0	q_1	q_3	q_4	q_0	q_2
Output:	0	0	0	0	0	1