

DFA Examples

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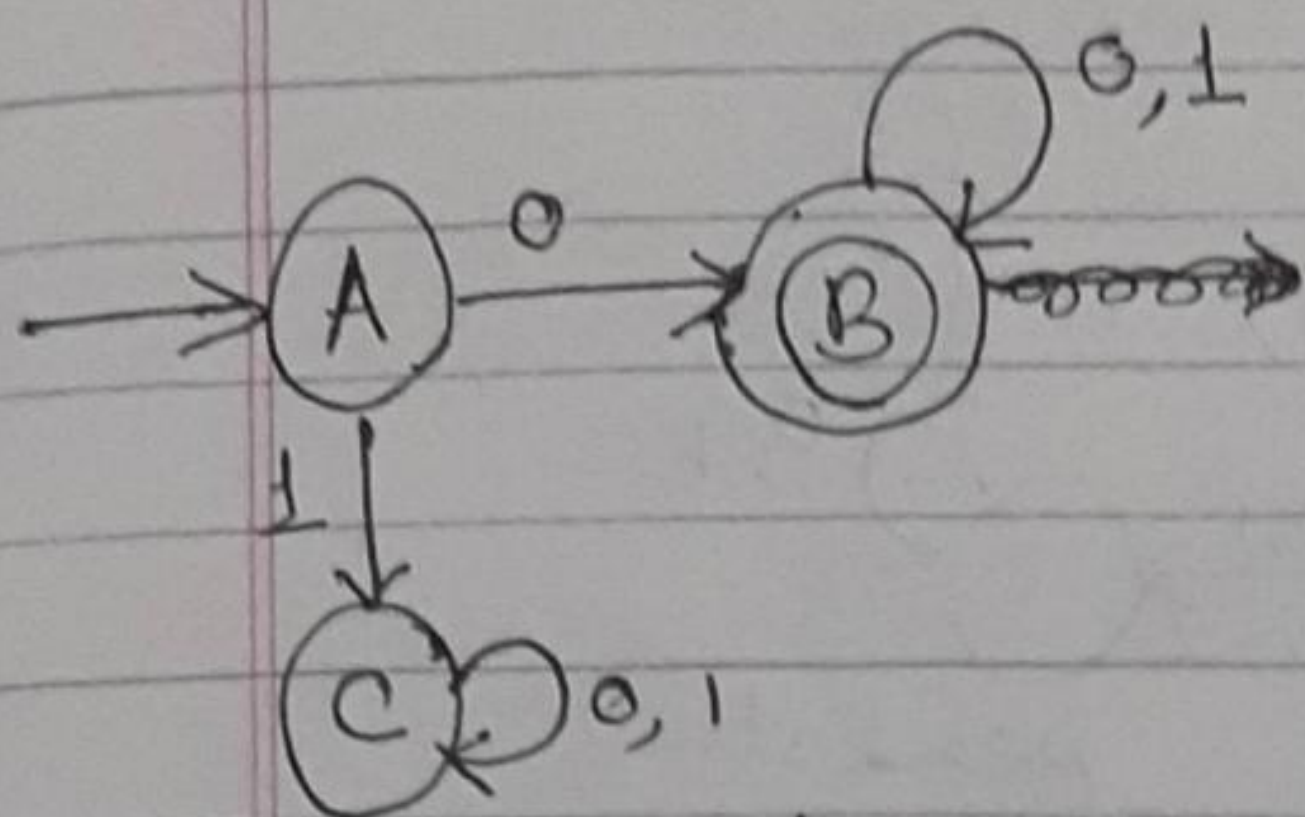
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Exmp 1

L_1 = set of all strings that start with '0'.

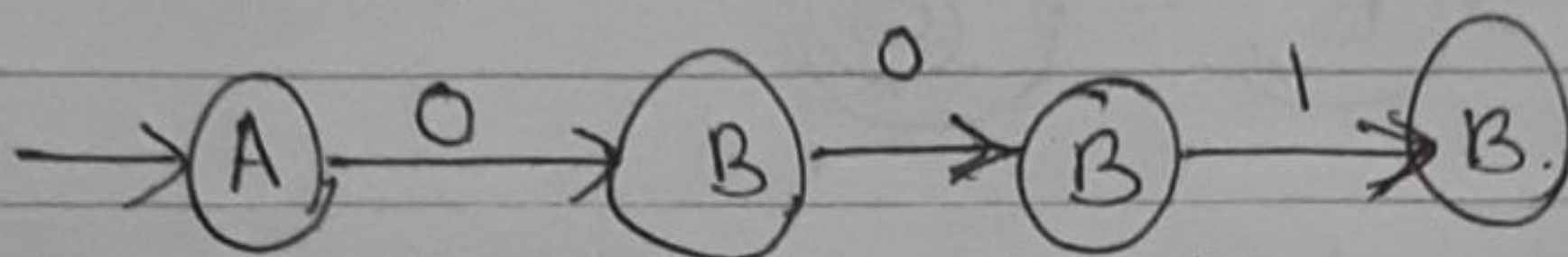
$= \{0, 00, 01, 000, 010, 011, 0000, \dots\}$

Infinite set

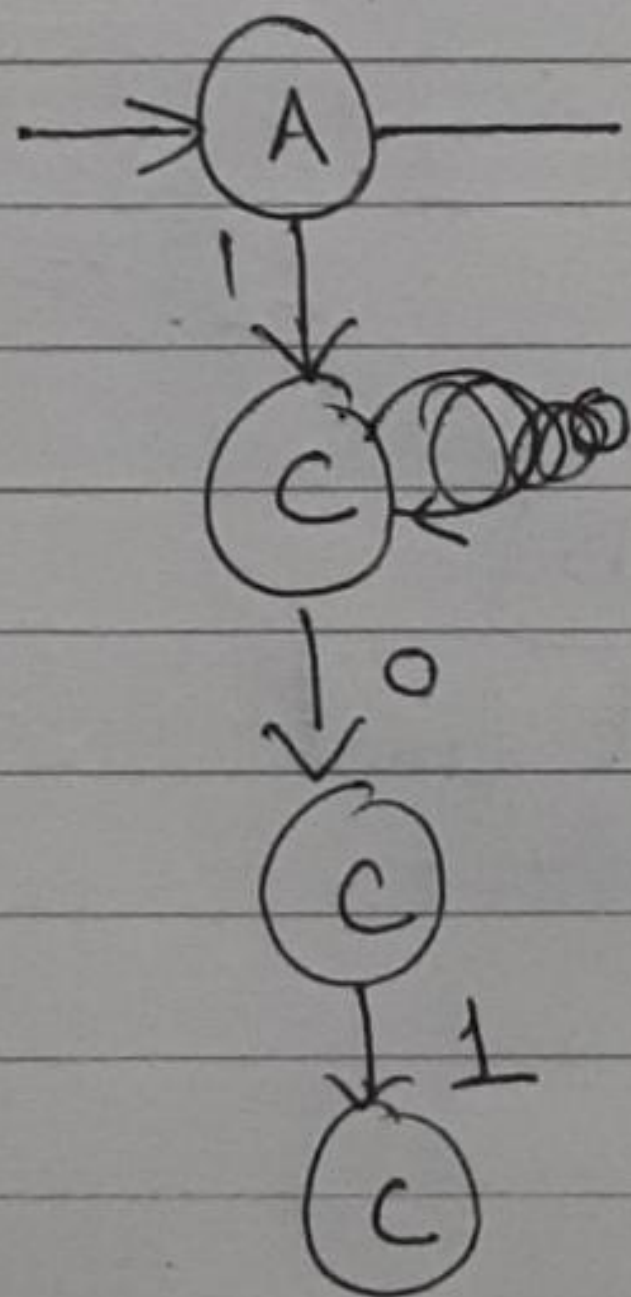


Trap / Dead state

check for 001 ✓



check for 101 ✗

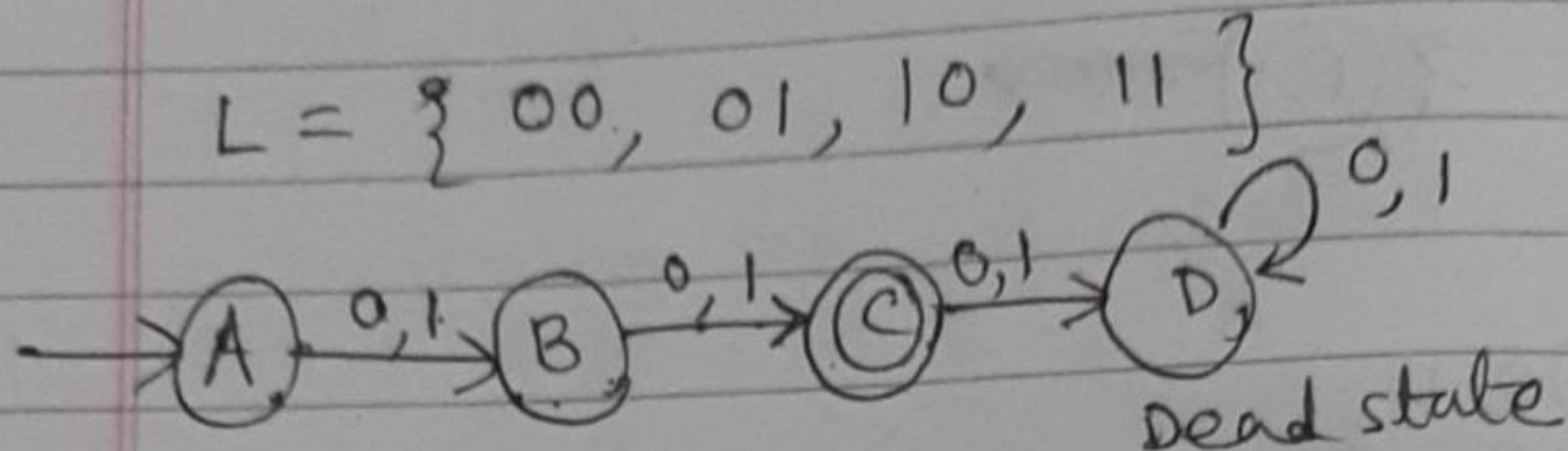


Exmp 2

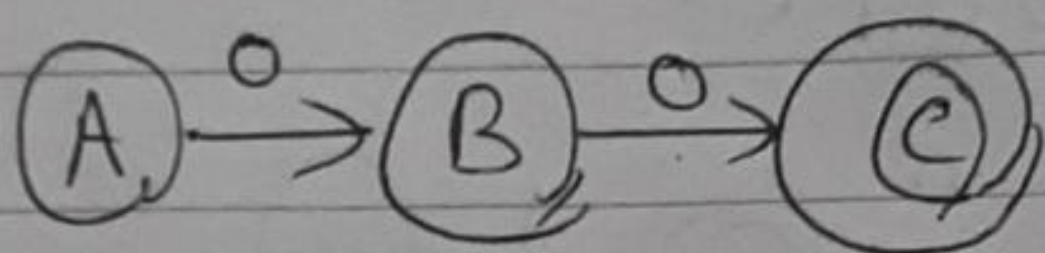
L2 = Construct a DFA that accepts sets of all strings over $\{0, 1\}$ of length 2.

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

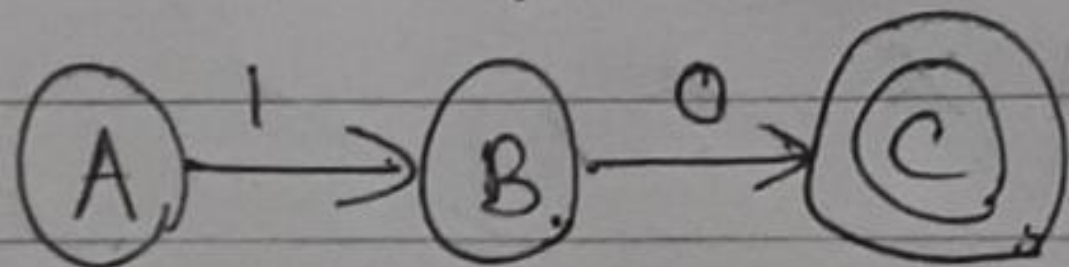
$$L = \{00, 01, 10, 11\}$$



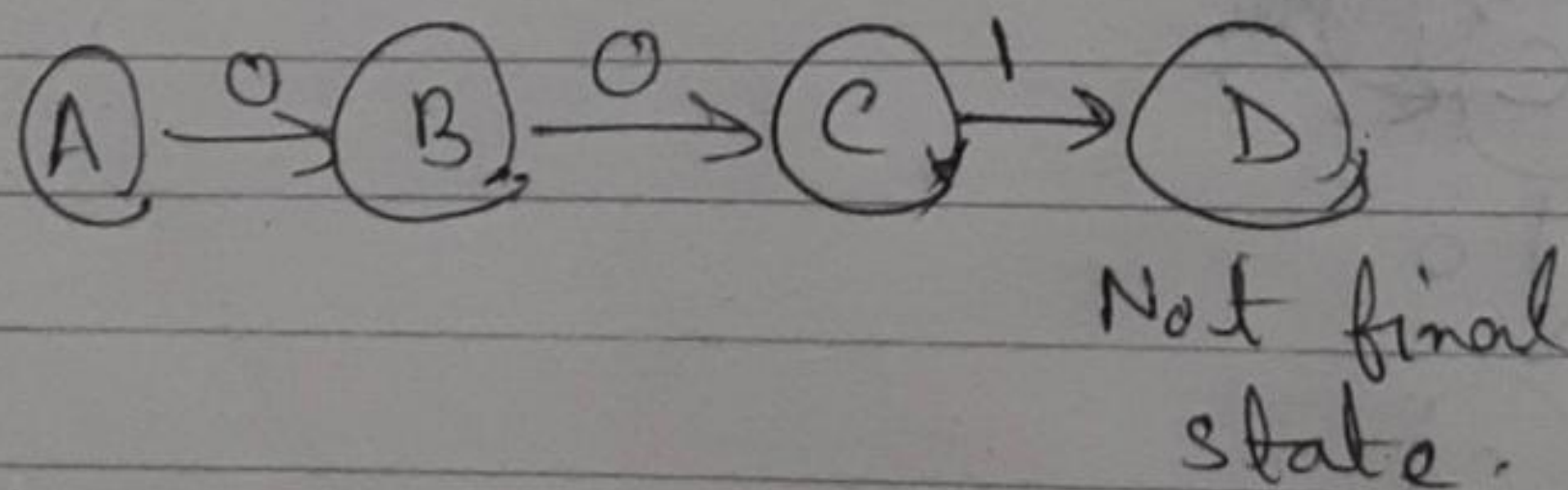
check for 00 ✓



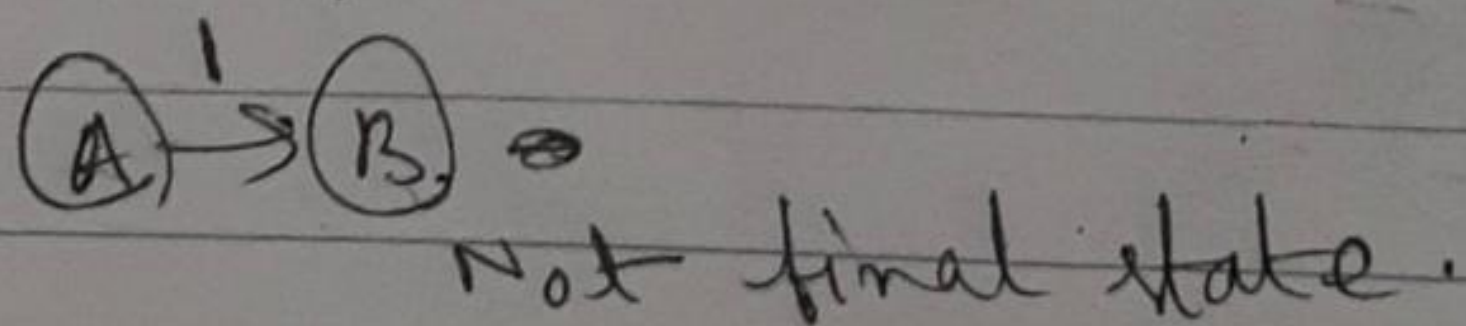
check for 10 ✓



check for 001 x



check for 1



FA from Regular Expression

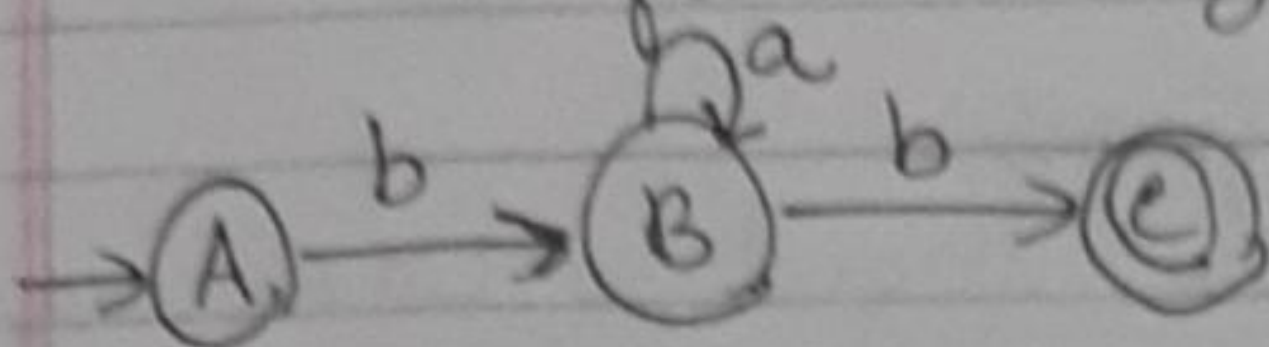
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Exmp. 1: ba^*b

$a^* = \{ \lambda, a, aa, aaa, \dots \}$

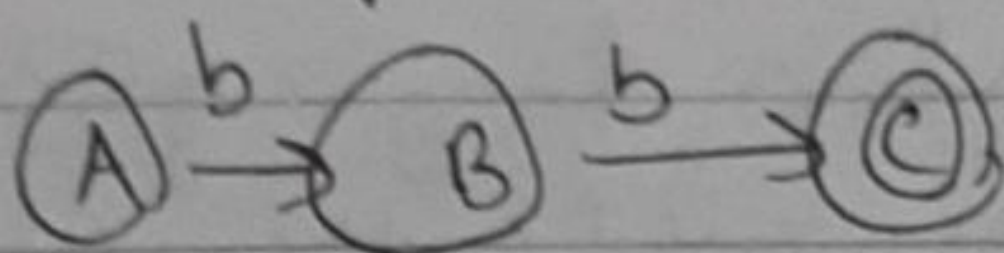
i.e. $bb, bab, baab, \dots$

↓
b followed by no. of 'a' and b.



$b \wedge a^*b$
And operation

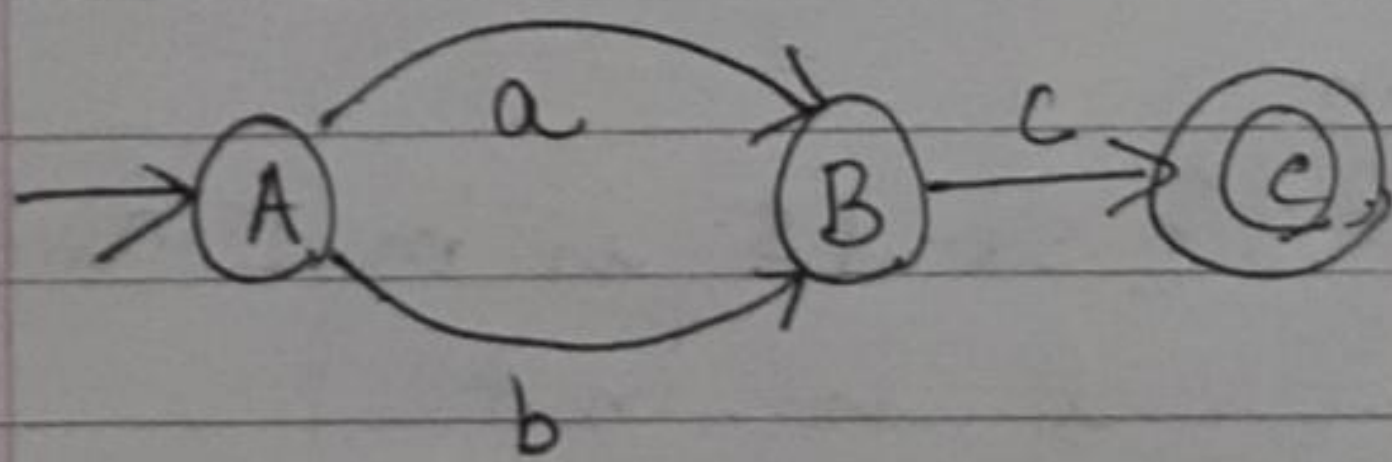
check for bb



bab

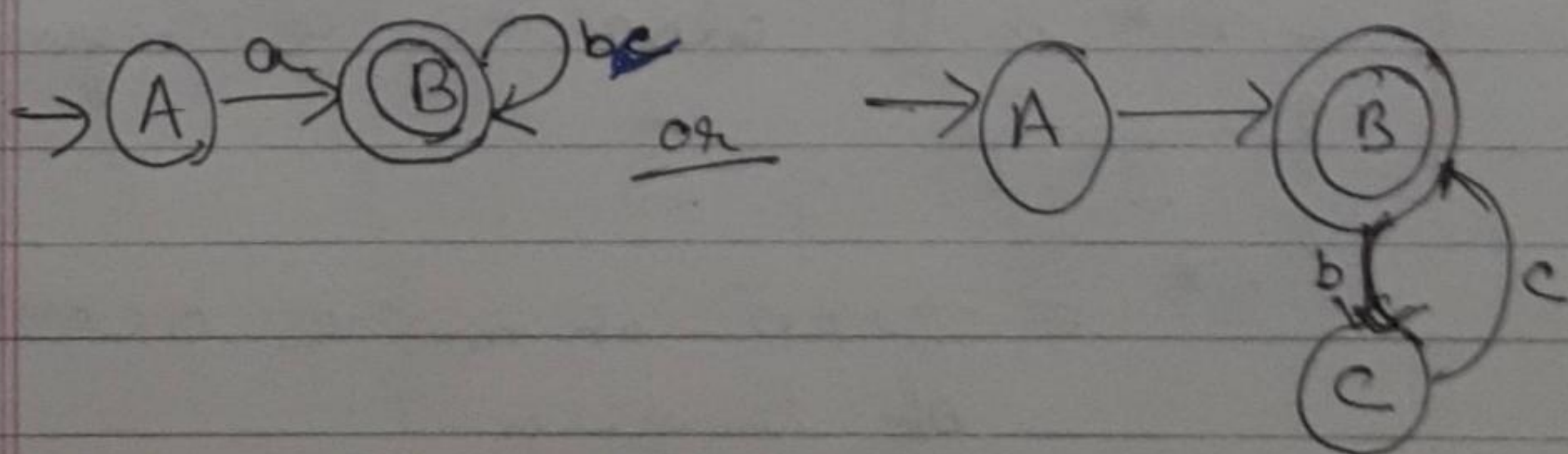
Exmp 2: $(a+b)c$

↓
Treat this as OR



Examp 3: $a(bc)^*$

$a, abc, abcbcb, abcbcbcb, \dots$



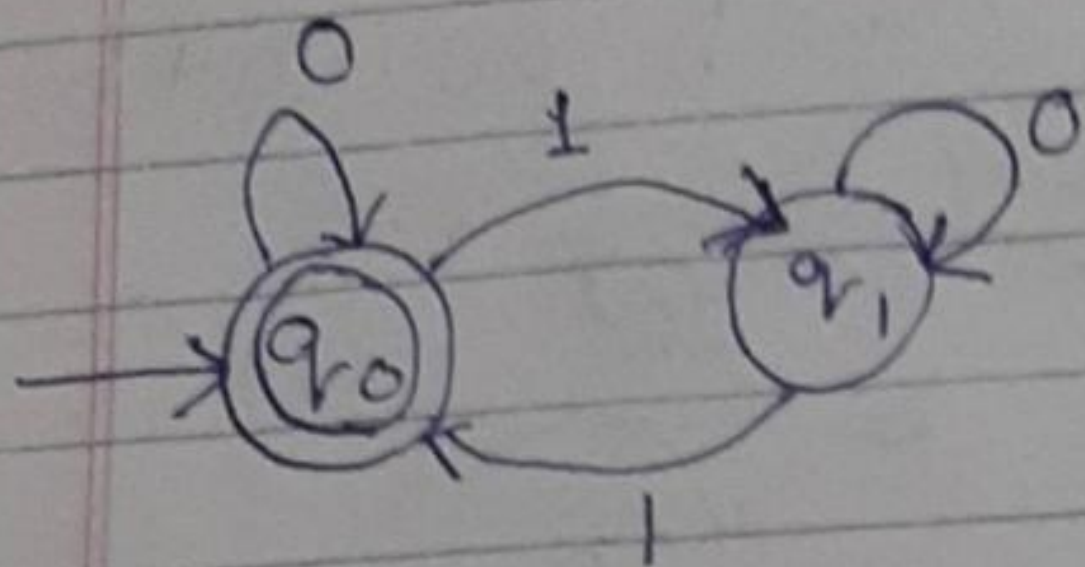
Example of DFA

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Ex 1.

$L_1 = \{w \in \{0,1\}^* \mid w \text{ has an even no. of 1's}\}$ such that



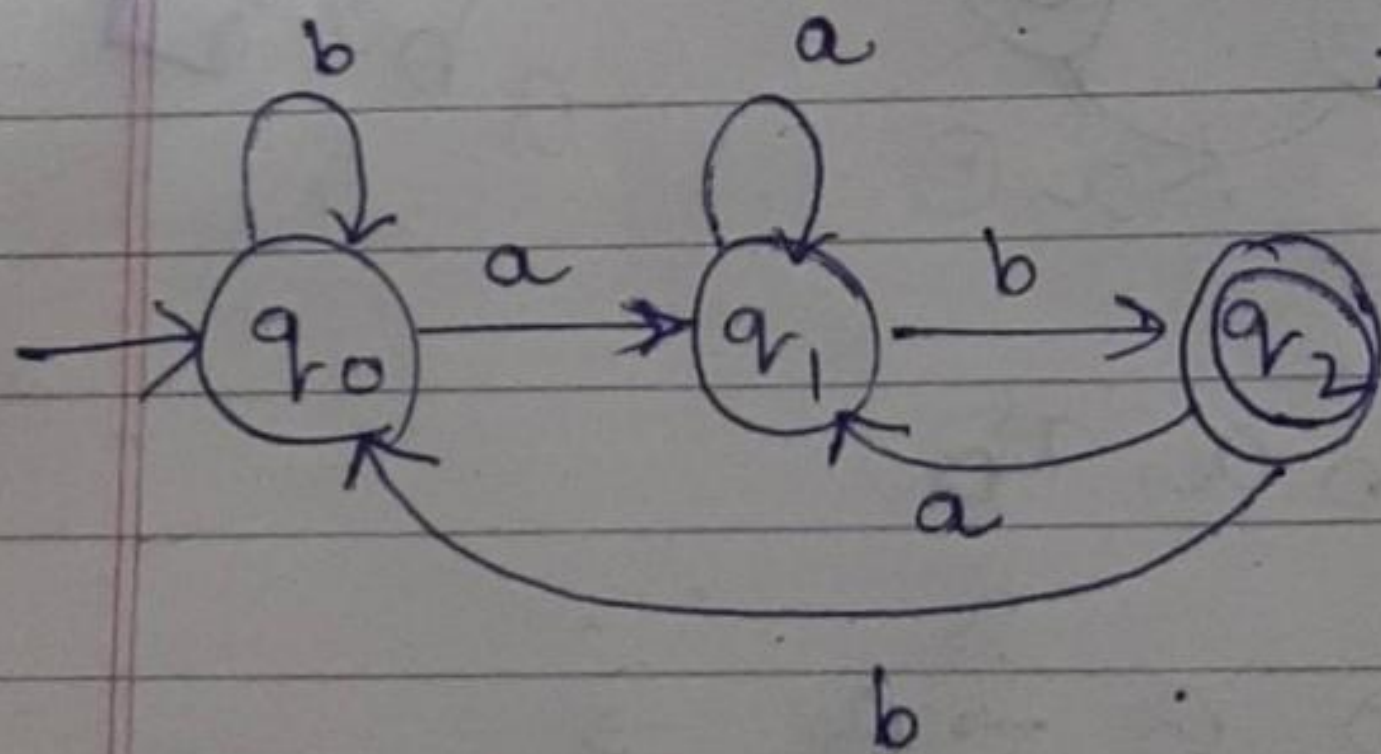
01, 0101, 1101
"

$q_0 \rightarrow$ all strings having an even no. of 1's

$q_1 \rightarrow$ all strings having an odd no. of 1's

Ex 2.

$L_2 = \{w \in \{a,b\}^* \mid w \text{ ends with the substring } ab\}$



~~q0 to q2~~

$w \in \{ \underline{a} \underline{ab}, \underline{ab} \underline{ab}, \underline{baabab} \}$

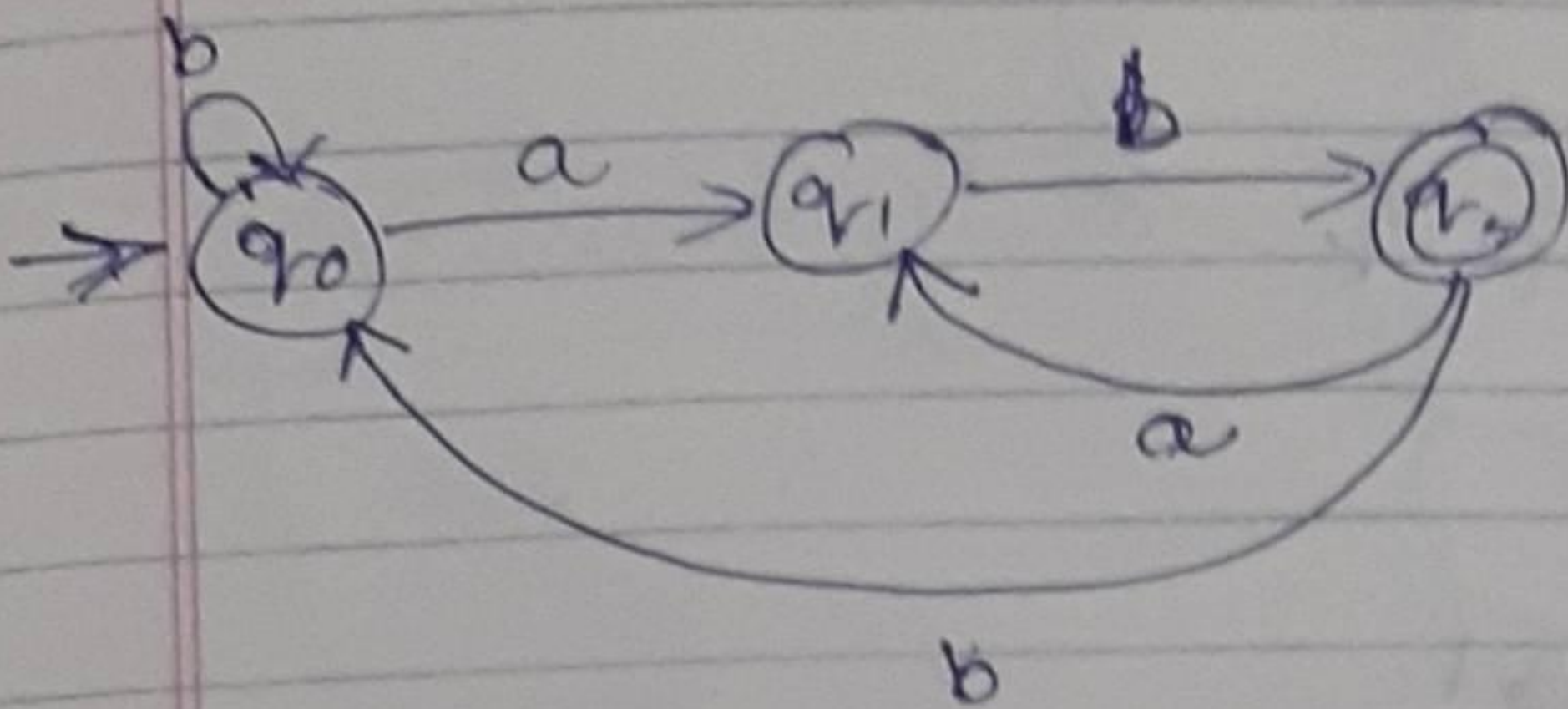
$\underline{baaabab}, \underline{baabaaab}, \dots$

$\underline{ab}, \underline{aab}, \underline{bab}, \underline{baab}$

$\Sigma = \{\lambda, a, b, aa, bb, aab, abb, \dots\}$

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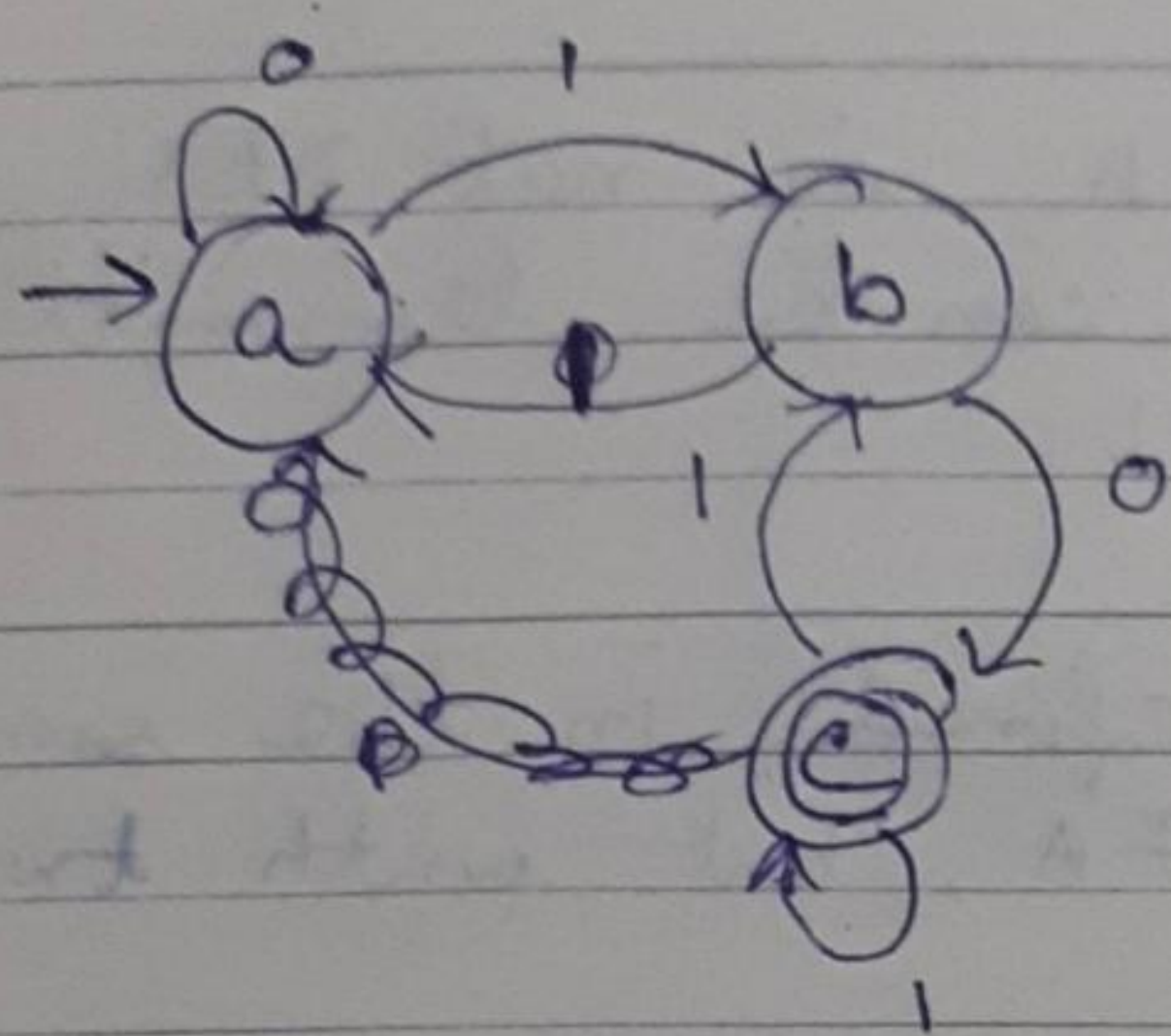
$ab, aab, aaab, bab, bbab, \dots$



Ex. 1

Let DFA be $Q = \{a, b, c\}$
 $\Sigma = \{0, 1\}$ $q_0 = \{a\}$
 $F = \{c\}$

Present state	0	1
a	a	b
b	c	a
* c	b	c



Ex. 2

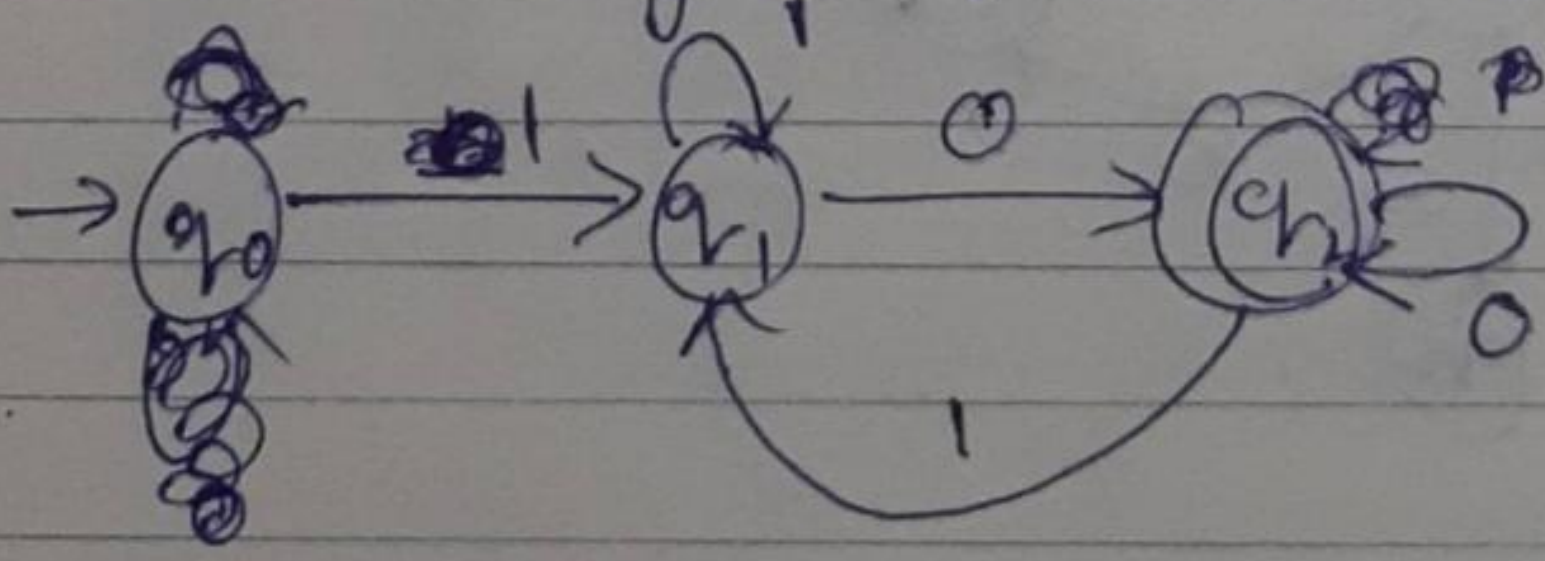
DFA with $\Sigma = \{0, 1\}$

accept those strings which starts with 1 and ends with 0.

Solⁿ

$L = \{10, 1000, 100, 1010, \dots\}$

Min^m length of the string is 2



no. of states

$$2 + 1 = 3$$

check for 1010100

As string starts with 1 so no self loop is with q_0