

24/2/66

# X. I. E. ASSIGNMENT

Mahim, Mumbai

1

AT

Page No. :

Date :

## FORMAL DEFINITION OF (FA)

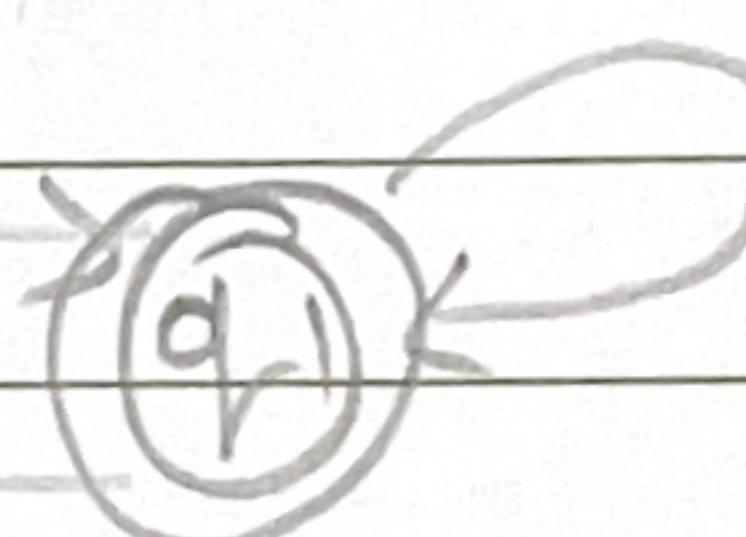
- ALSO KNOWN AS FINITE STATE MACHINE [FSM] IS AN ABSTRACT MACHINE USED TO RECOGNIZE PATTERNS AND CHECKING OR EVALUATING CERTAIN CONDITIONS IN INPUT SEQUENCES.
- THEY CONSIST OF STATES AND TRANSITIONS

## DECIMAL NUMBER DIVISIBLE BY 2, 3, 4, 5

- BY 2



[0, 2, 4, 6, 8]

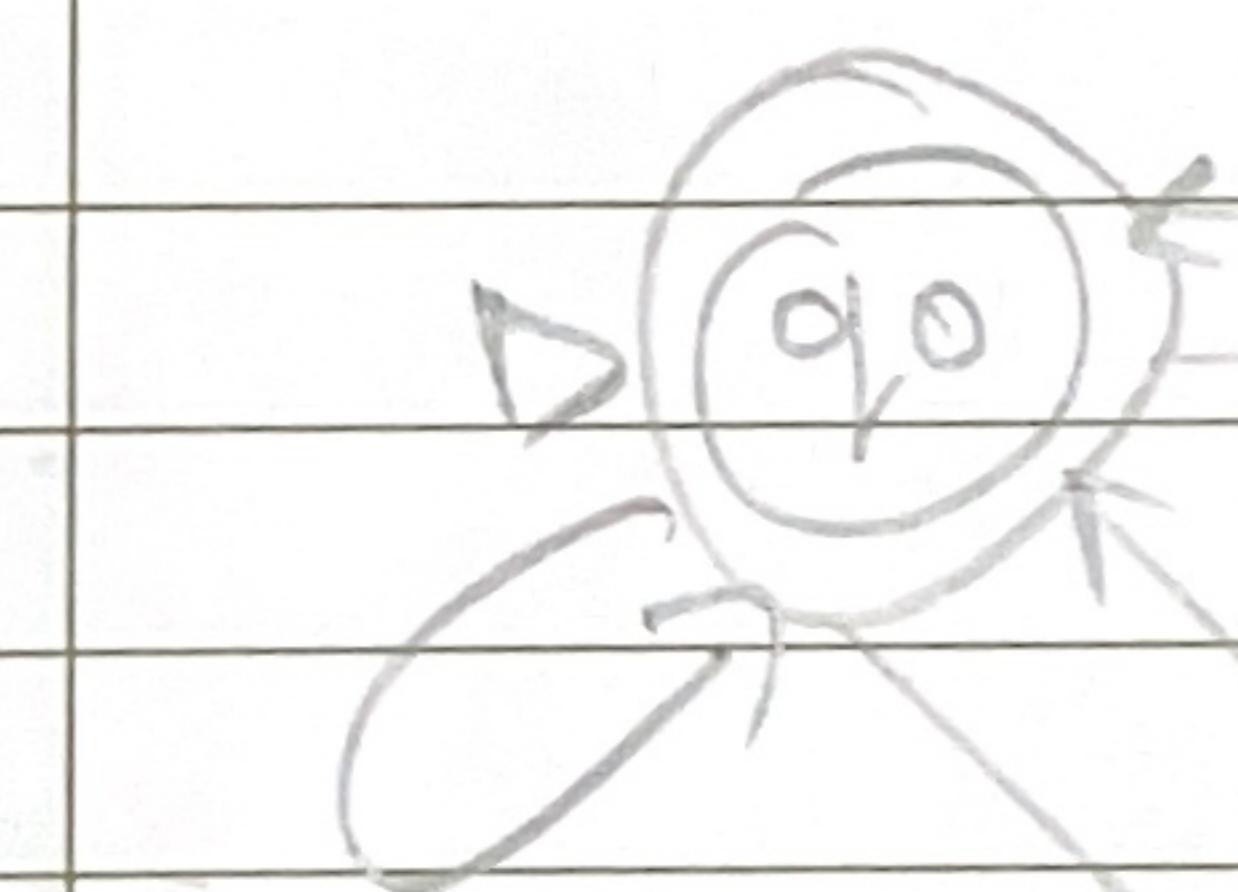


[0, 2, 4, 6, 8]

[1, 3, 5, 7, 9]

[1, 3, 5, 7, 9]

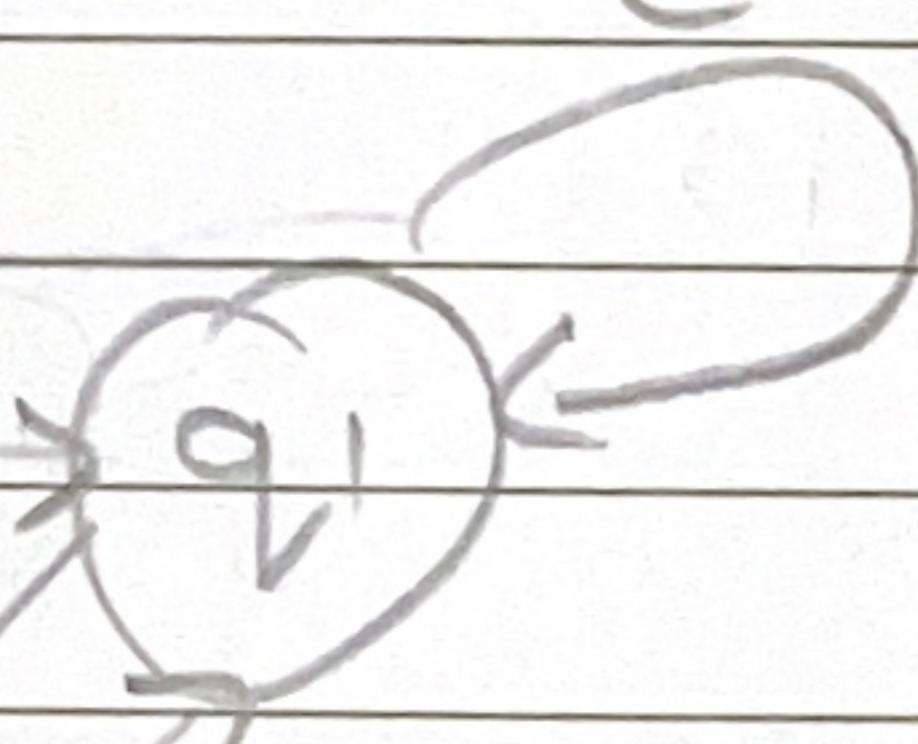
- BY 3



[2, 5, 8]

[0, 3, 6, 9]

[1, 4, 7]

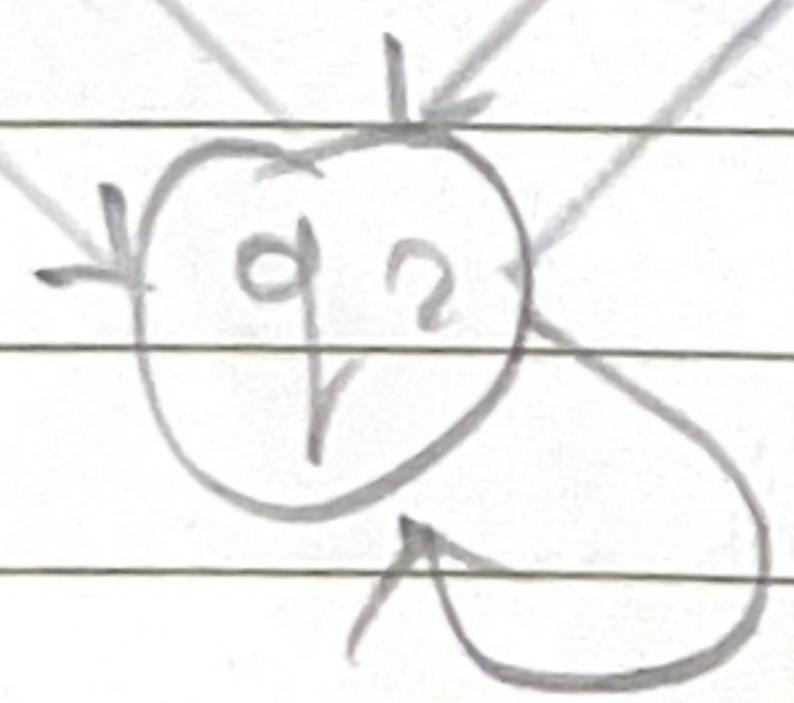


[0, 3, 6, 9]

[1, 4, 7]

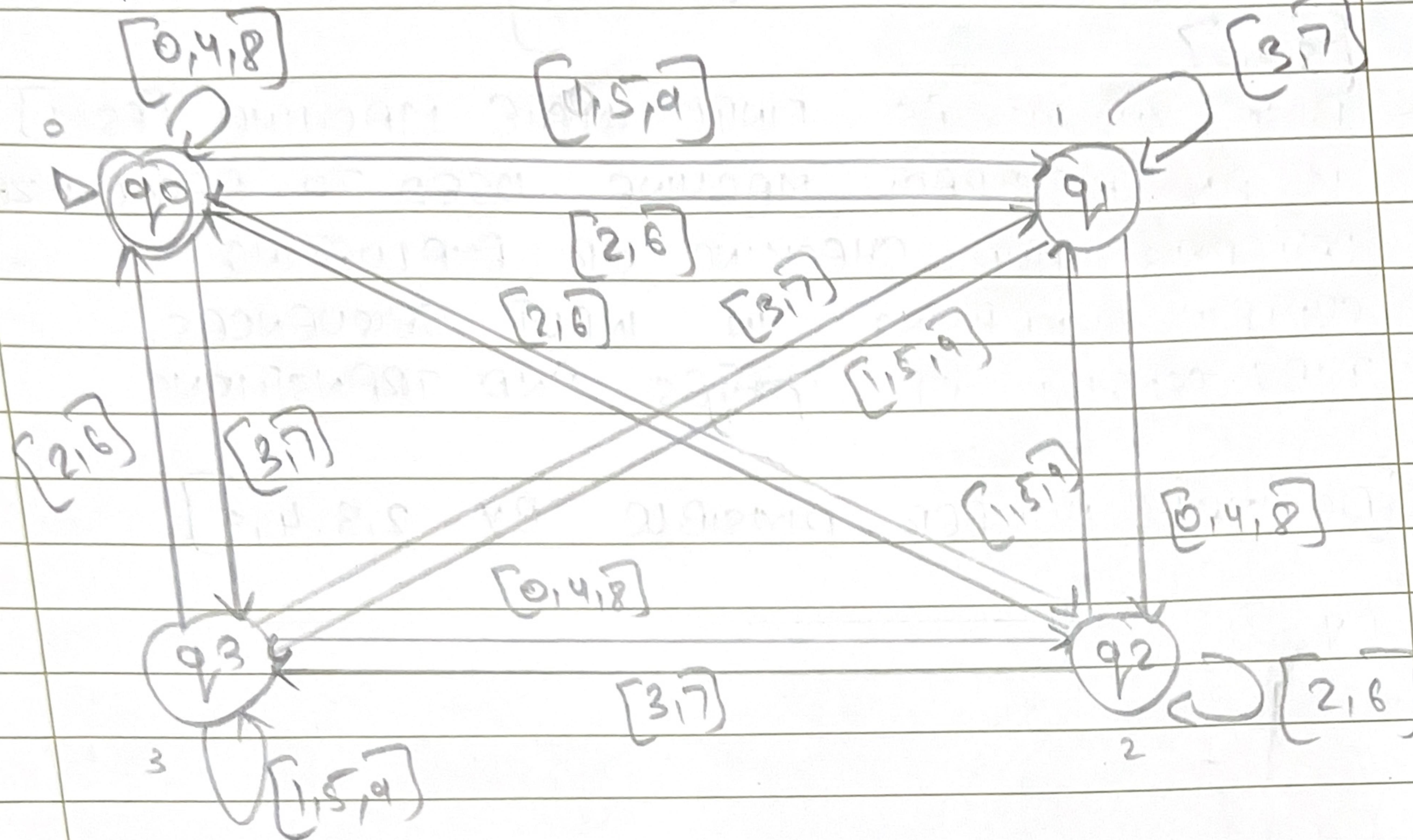
[2, 5, 8]

[2, 5, 8]



[0, 3, 6, 9]

- BY 4

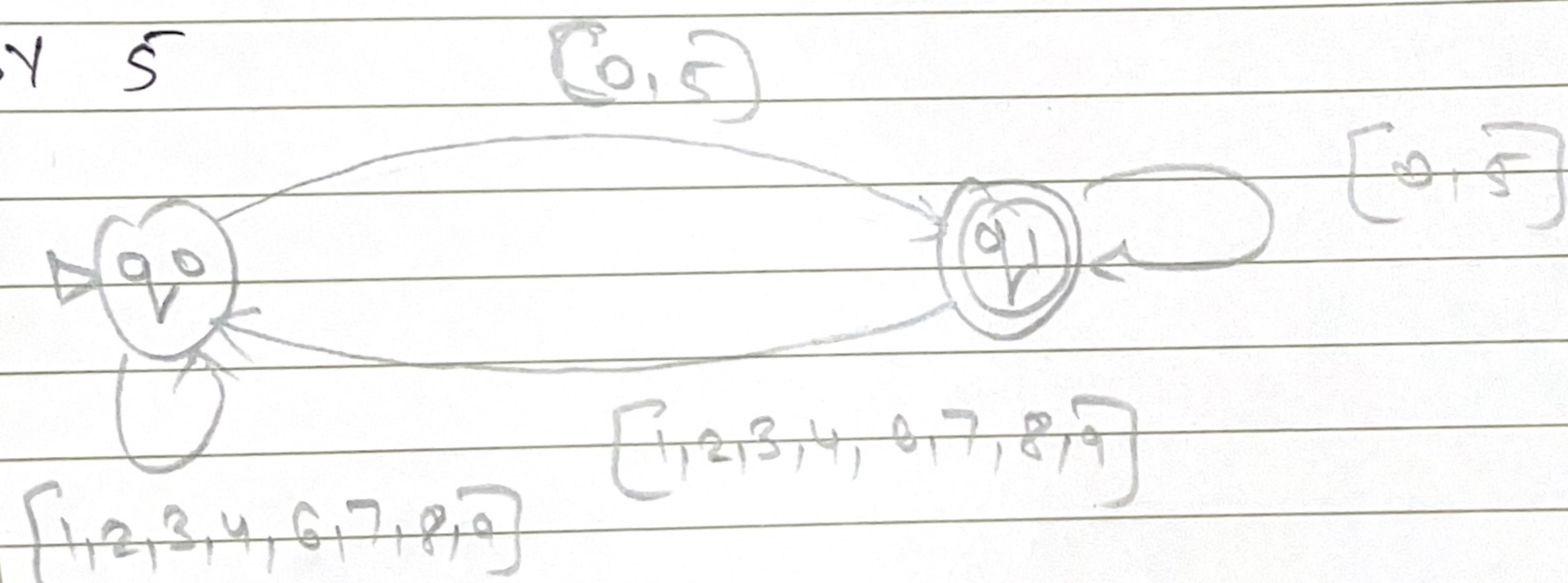


- BY 3

$q^0$   
 $q^1$   
 $q^2$

- BY 4.

- BY 5



$q^0$   
 $q^1$   
 $q^2$   
 $q^3$

TRANSITION TABLES

- BY 2

	0, 2, 4, 6, 8	1, 3, 5, 7, 9
$q^0$		$q^1$
$q^1$		$q^1$

- BY 5

$q^0$   
 $q^1$

# X. I. E.

Mahim, Mumbai

Page No. :

Date :

- BY 3

0, 3, 6, 9

1, 4, 7

2, 5, 8

q<sup>0</sup>

(q<sup>0</sup>)

q<sup>1</sup>

(q<sup>2</sup>) q<sup>2</sup>

q<sup>1</sup>

q<sup>1</sup>

q<sup>2</sup>

(q<sup>0</sup>)

q<sup>2</sup>

q<sup>2</sup>

(q<sup>0</sup>)

q<sup>1</sup>

- BY 4.

0, 4, 8

1, 5, 9

2, 6

3, 7

q<sup>0</sup>

(q<sup>0</sup>)

q<sup>1</sup>

(q<sup>0</sup>)

q<sup>3</sup>

q<sup>1</sup>

q<sup>2</sup>

q<sup>3</sup>

(q<sup>0</sup>)

q<sup>1</sup>

q<sup>2</sup>

(q<sup>0</sup>)

q<sup>1</sup>

(q<sup>0</sup>)

q<sup>1</sup>

q<sup>3</sup>

q<sup>2</sup>

q<sup>3</sup>

(q<sup>0</sup>)

q<sup>1</sup>

- BY 5

1, 2, 3, 4, 6, 7, 8, 9

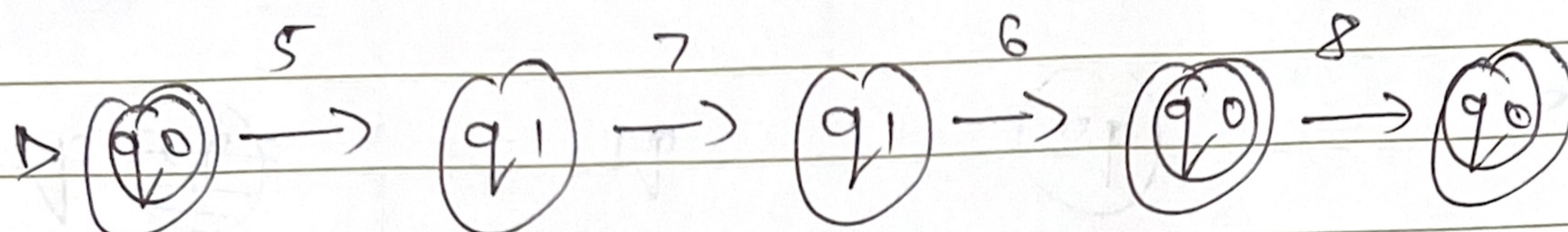
q<sup>0</sup>  
q<sup>1</sup>

q<sup>0</sup>  
q<sup>0</sup>

0, 5  
(q<sup>1</sup>)  
(q<sup>1</sup>)

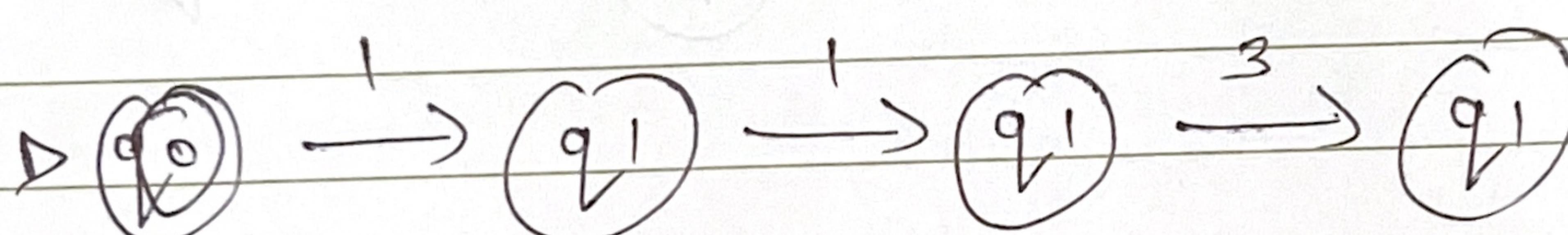
[EXAMPLE - BY 2]

INPUT - 5768



ACCEPTED

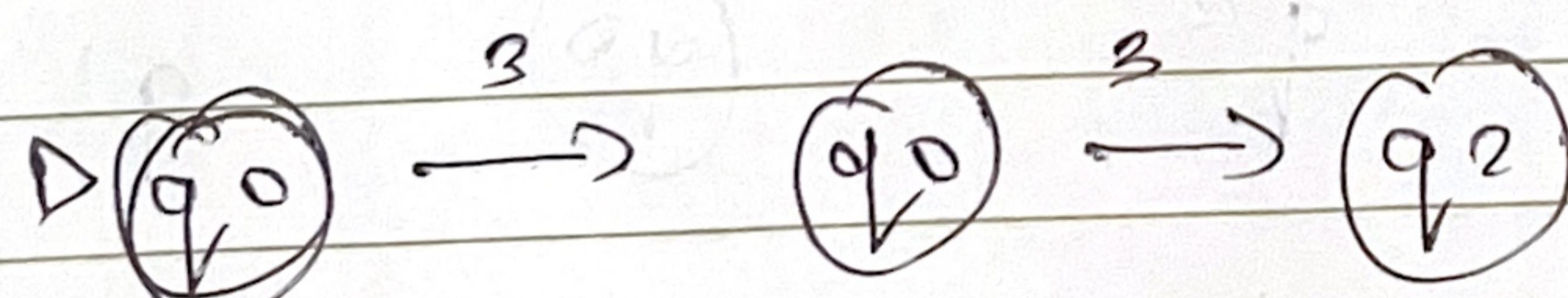
INPUT - 113



REJECTED

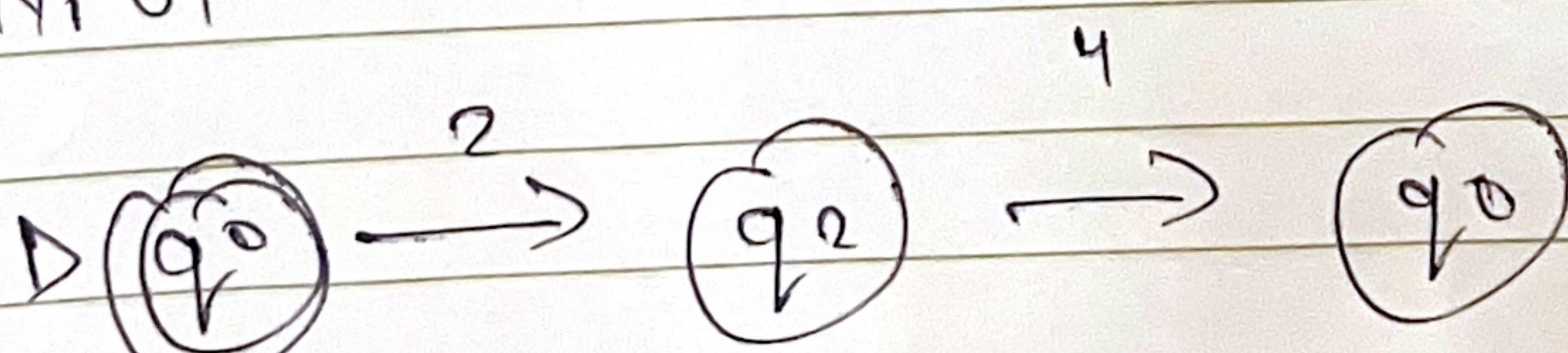
[EXAMPLE - BY 3]

INPUT - 32



REJECTED

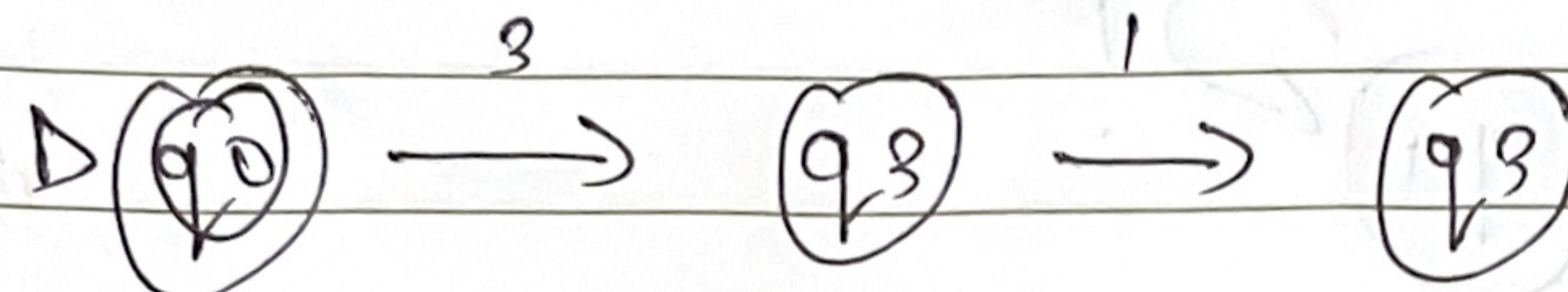
INPUT - 24



ACCEPTED

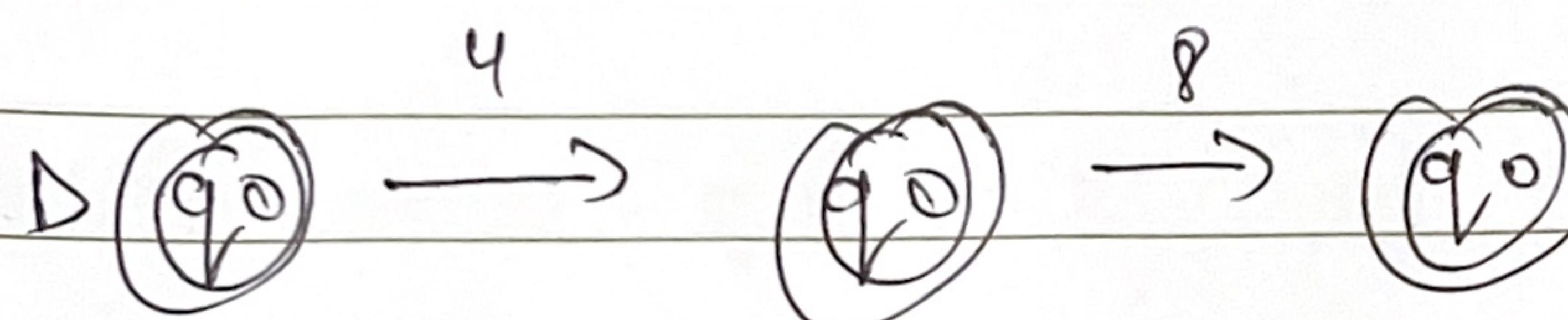
[EXAMPLE BY - 4]

INPUT - 31



REJECTED

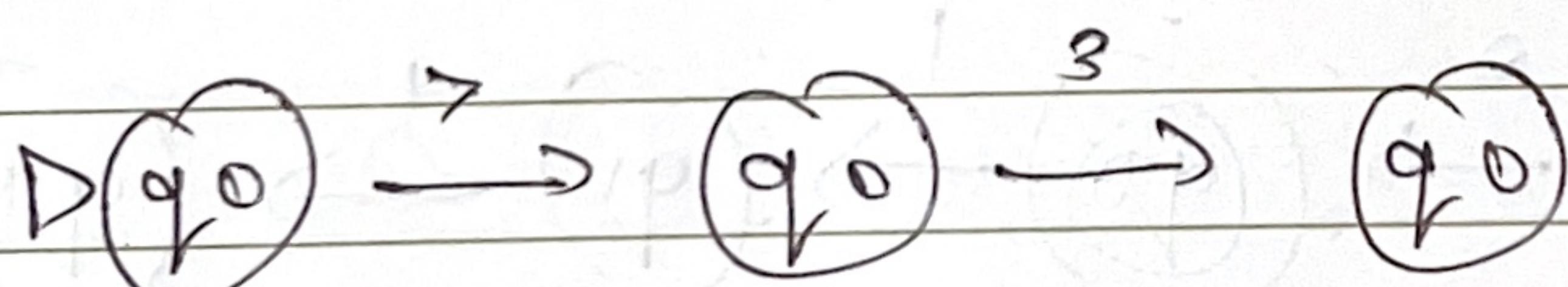
INPUT - 48



ACCEPTED

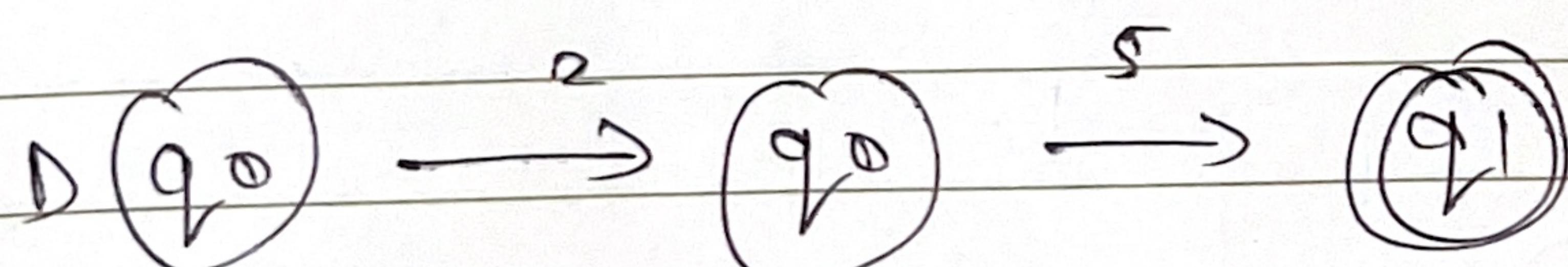
[EXAMPLE - BY 5]

INPUT - 73



REJECTED

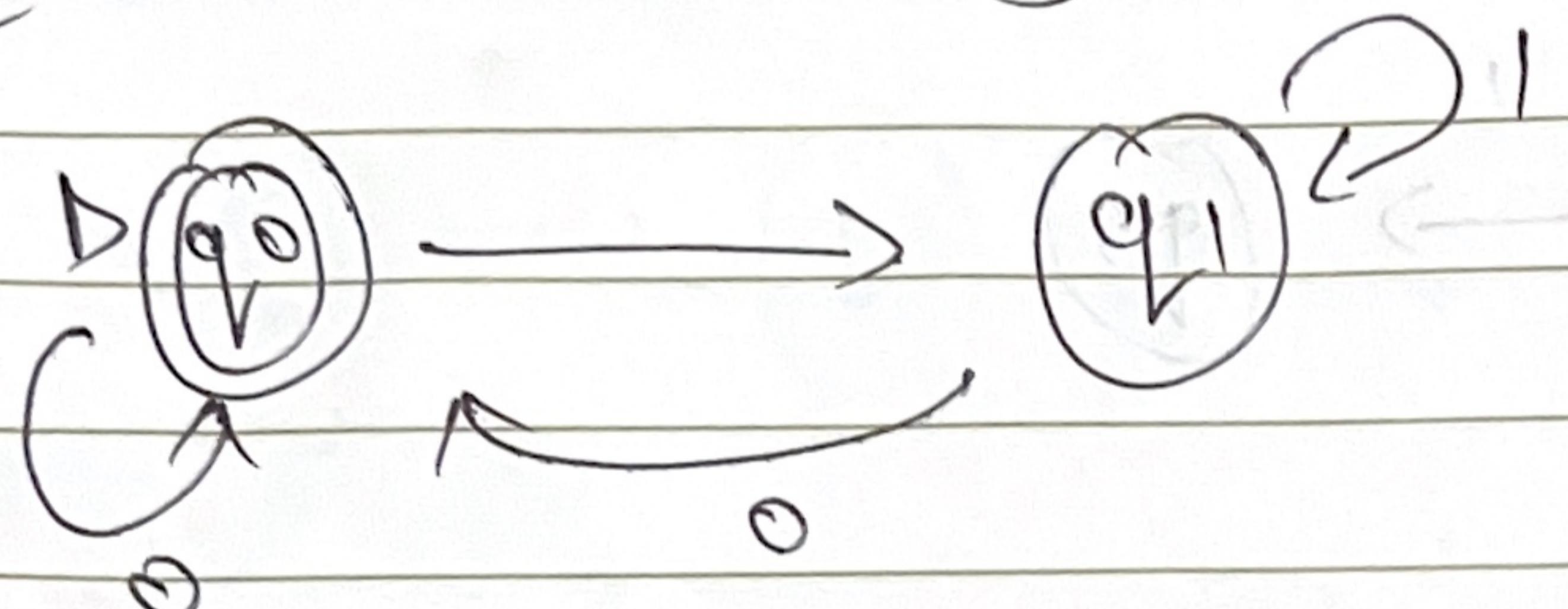
INPUT - 25



ACCEPTED

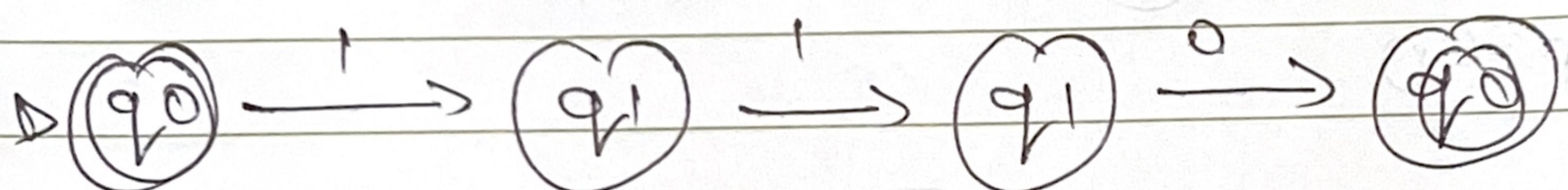
[FA] DIVISIBLE BY  $2, 3, 4, 5$   $\Sigma = \{0, 1\}$

[BY - BINARY 2]



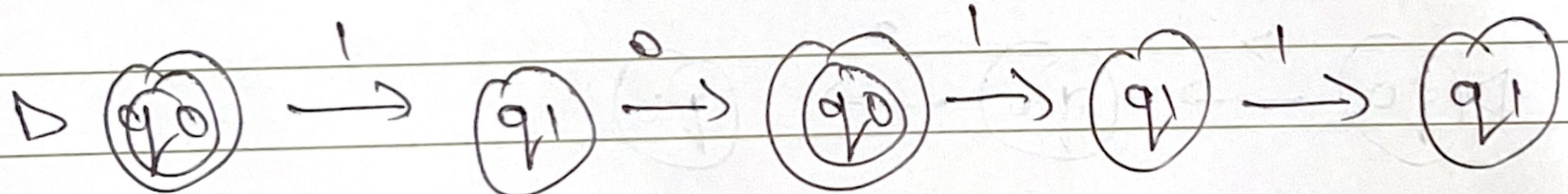
[EXAMPLE]

INPUT - .110



ACCEPTED

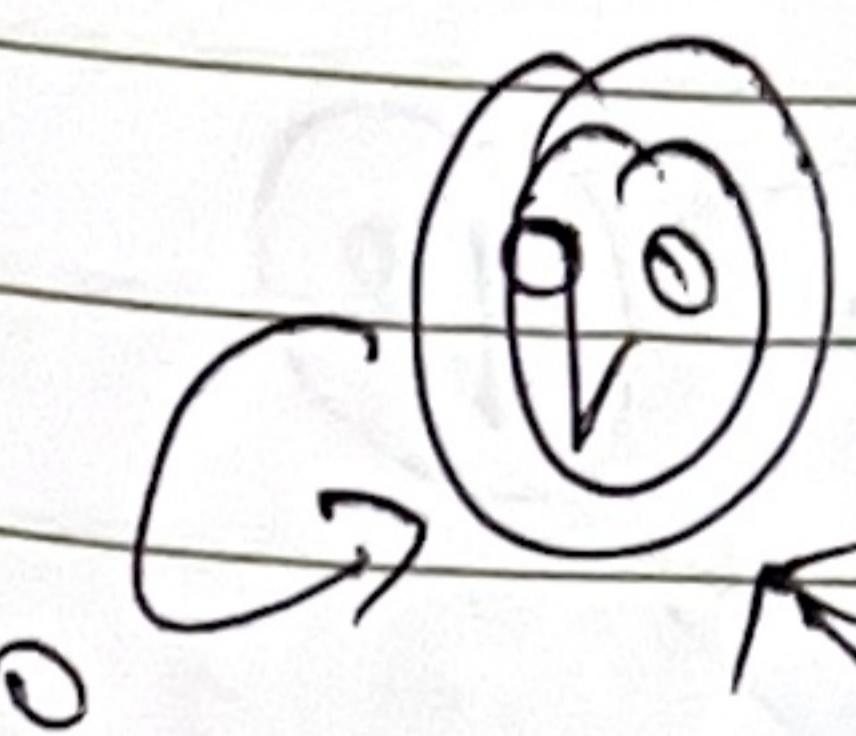
INPUT - 1011



REJECTED

BY [TABLE]

$q^0$	$0$	$1$	$q^0$
$q^1$	$q^0$	$q^1$	$q^1$
$q^2$	$q^1$	$q^2$	$q^2$



[EXAMPLE]

INPUT -



REJECTED

INPUT -

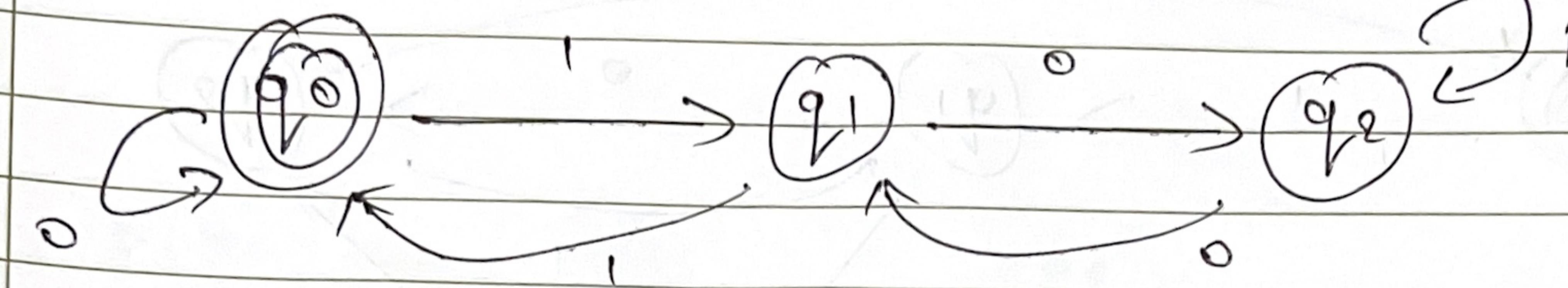


ACCEPTED

[TABLE]

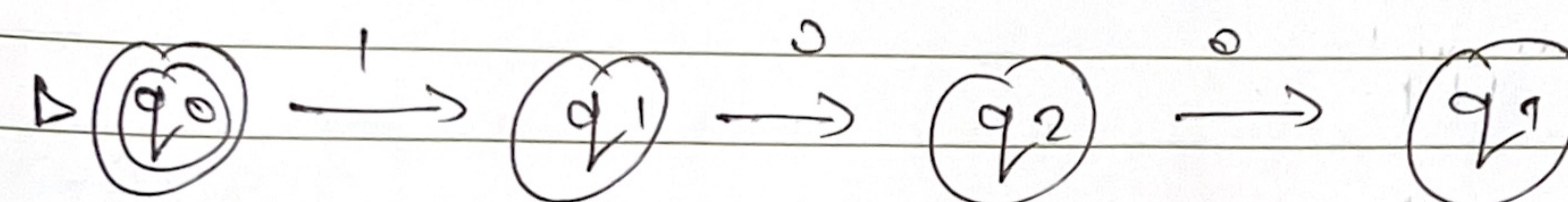
$= \{0, 1\}$

[BY - BINARY 3]



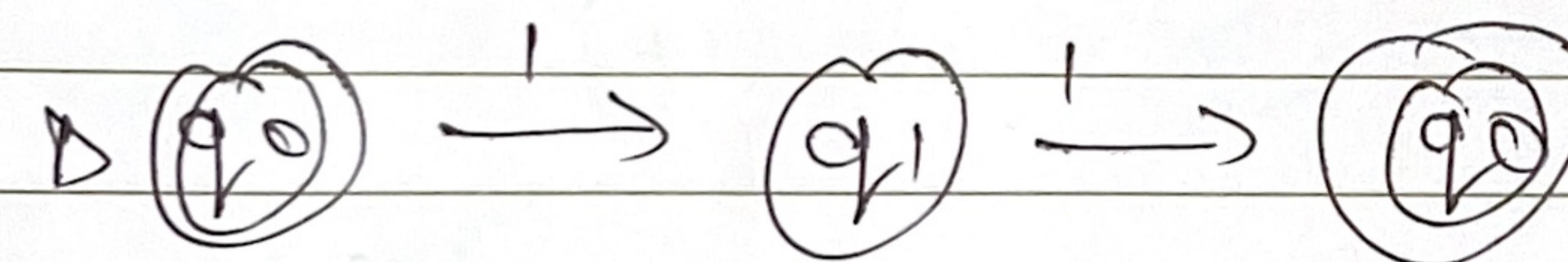
[EXAMPLE]

INPUT - 100



REJECTED

INPUT - 11

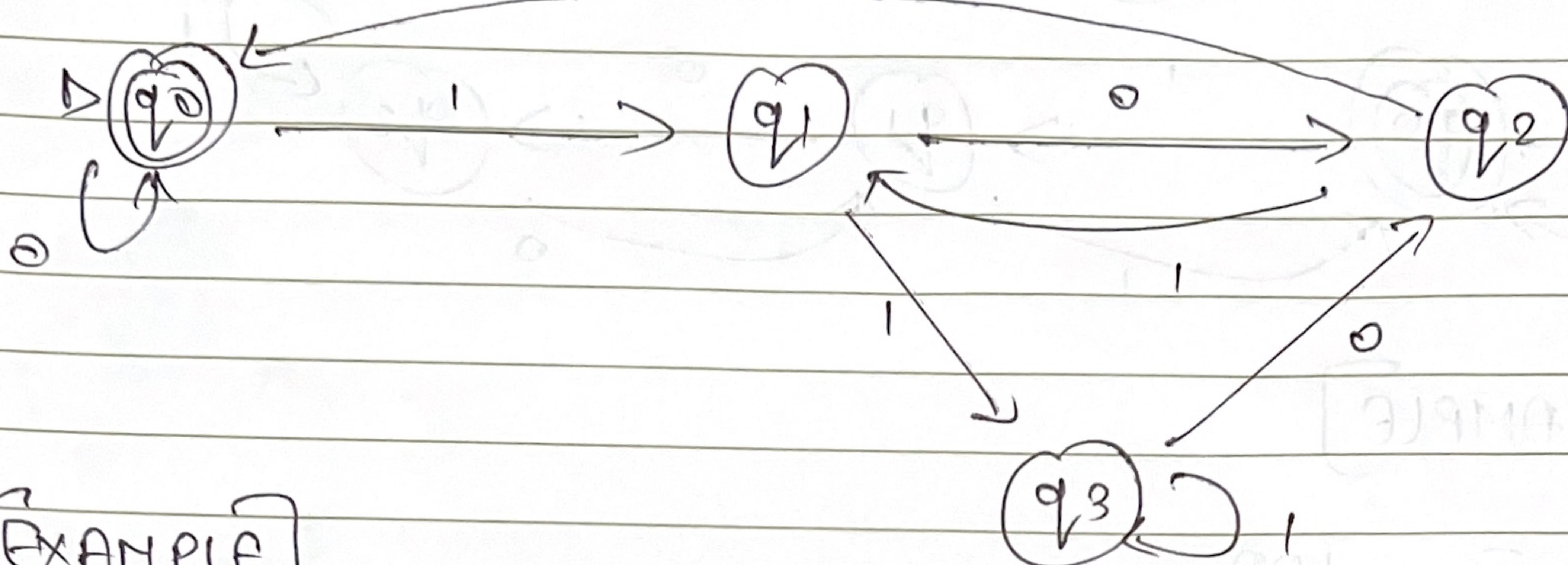


ACCEPTED

[TABLE]

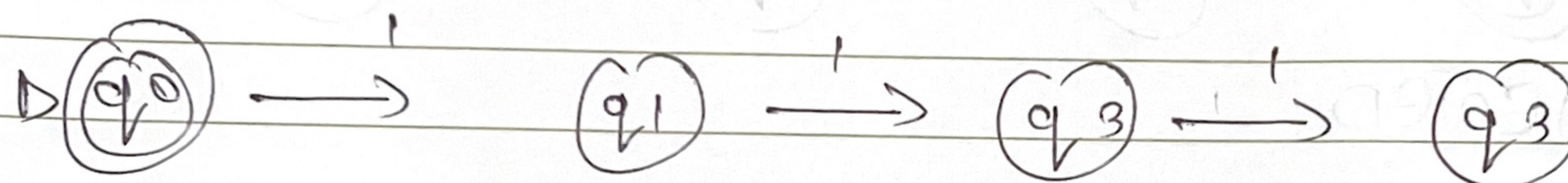
	0	1
$q^0$	$q_0$	$q_1$
$q^1$	$q_1$	$q_2$
$q^2$	$q_2$	$q_1$

BY BINARY - 4



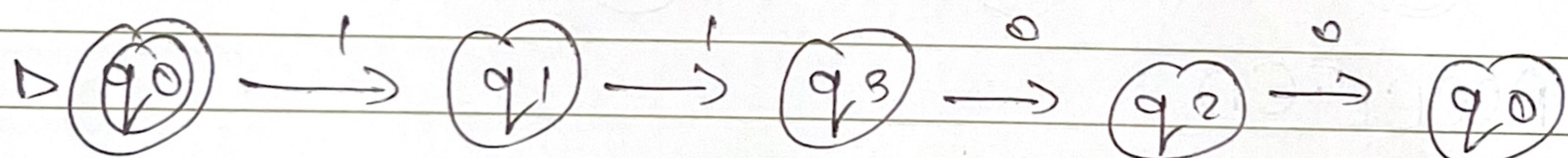
# EXAMPLE

INPUT - 111



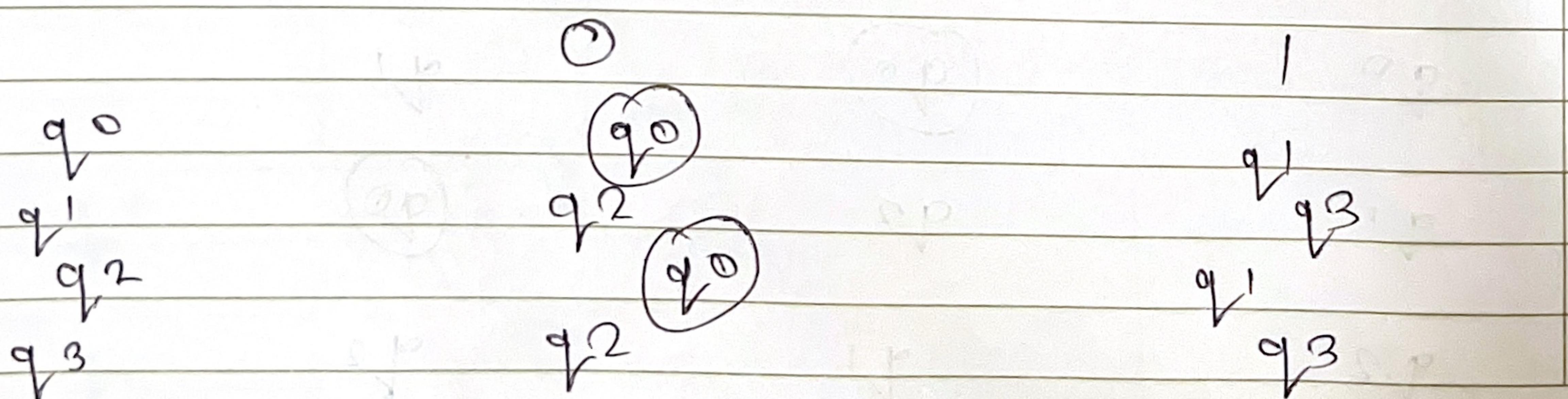
REJECTED

INPUT - 1100



Accepted

# TABLE



Page No. :

Date :

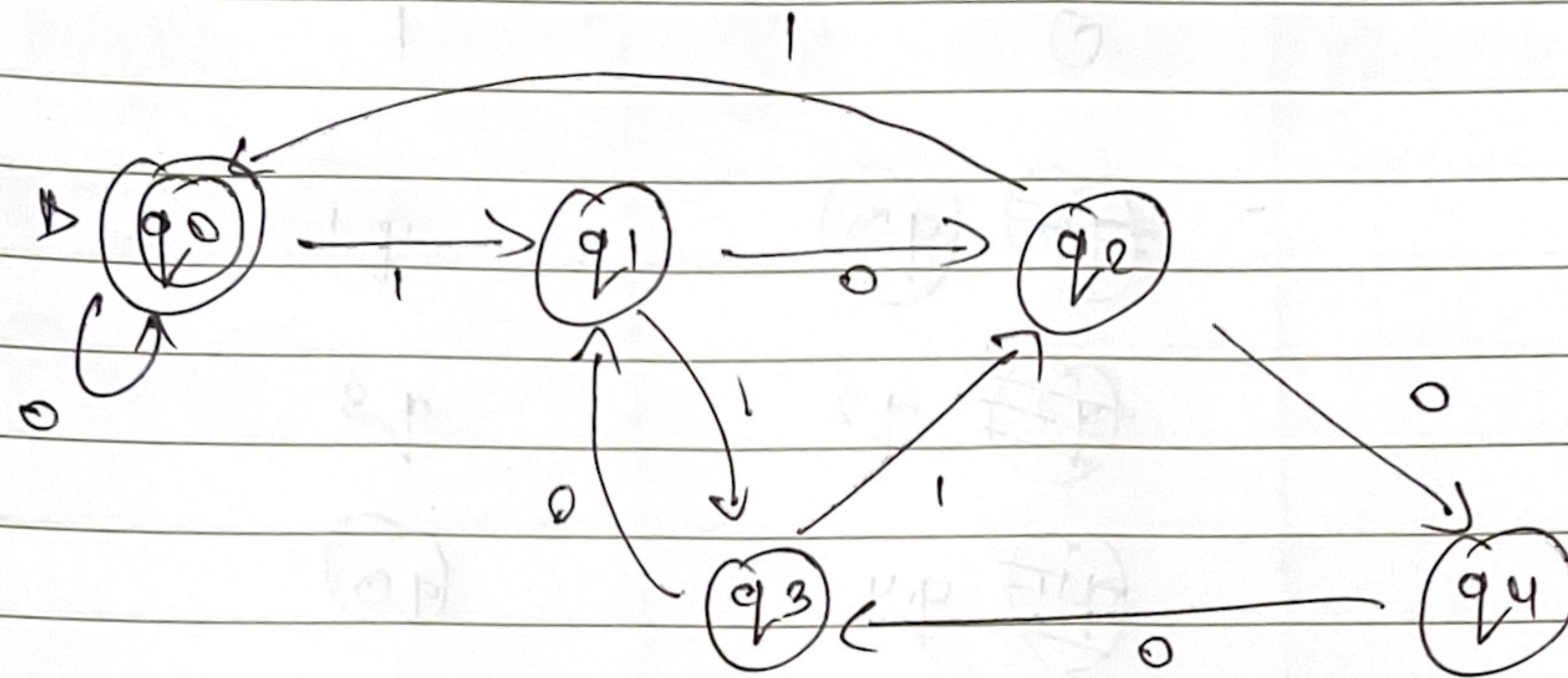
# X. I. E.

Mahim, Mumbai

Page No. :

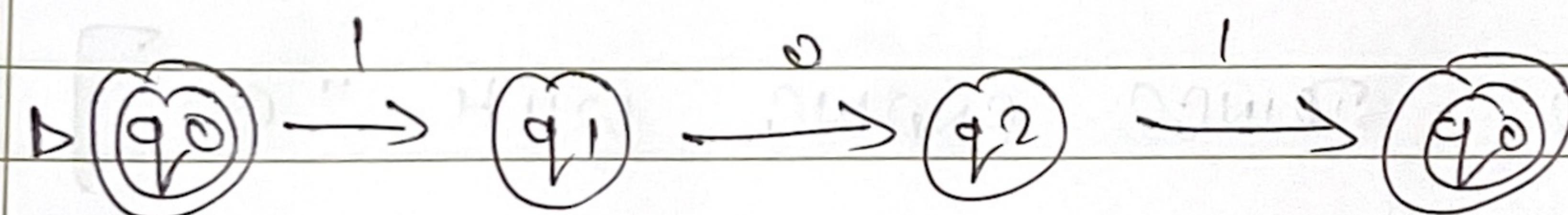
Date :

[BY BINARY - S]



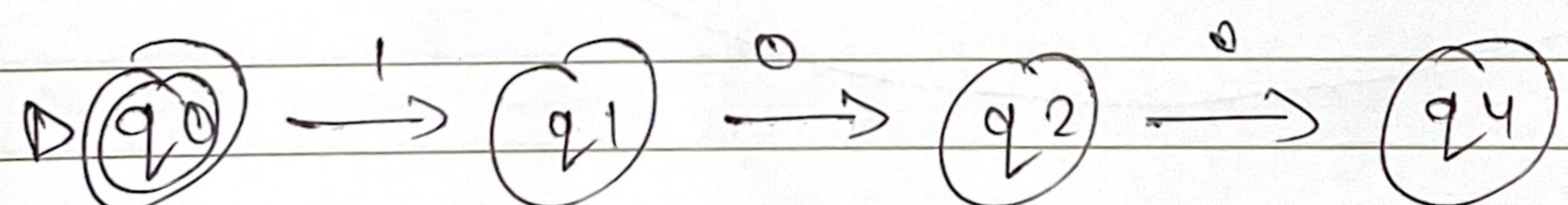
[EXAMPLE]

INPUT - 101



ACCEPTED

INPUT - 100



REJECTED

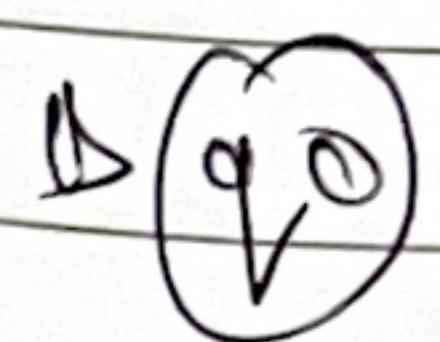
$q_3$

$q_1$   
 $q_3$

[TABLE]

	0	1	
$q_0$	<del><math>q_0</math></del> $q_0$	$q_1$	
$q_1$	<del><math>q_2</math></del> $q_2$	$q_3$	
$q_2$	<del><math>q_4</math></del> $q_4$	$q_0$	
$q_3$	<del><math>q_1</math></del> $q_1$	$q_2$	$q_0$
$q_4$	$q_3$	$q_4$	$q_1$

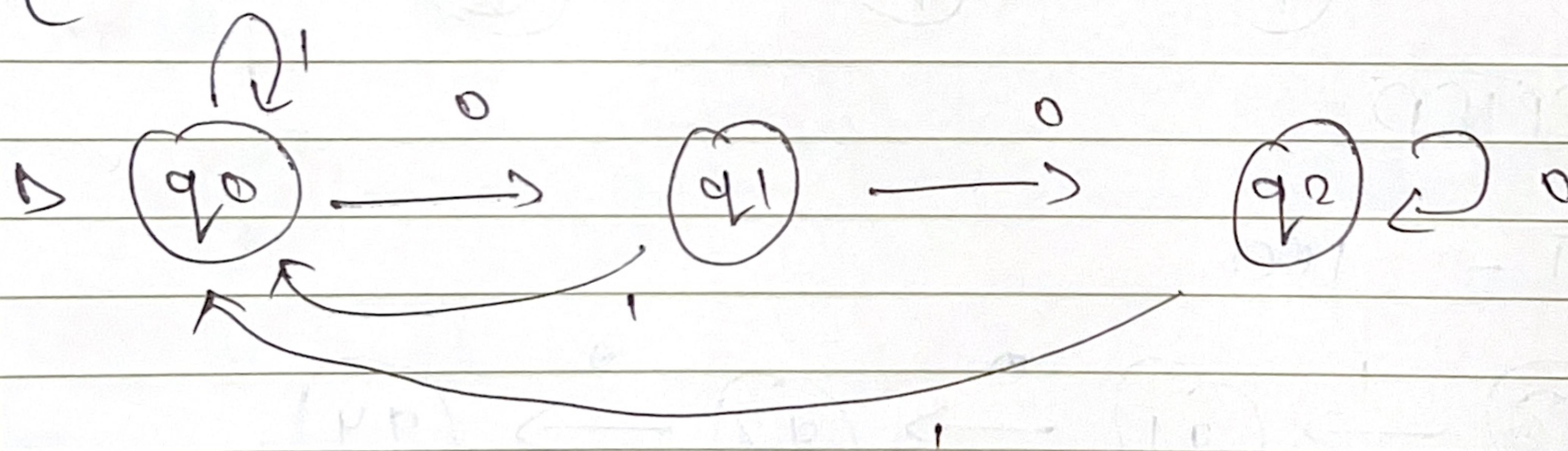
INPUT - 1



ACCEPTED

[TABLE]

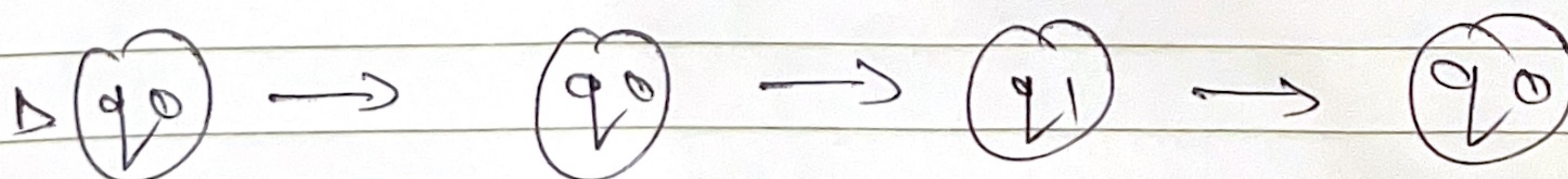
[FA] FOR STRINGS ENDING WITH "OO"



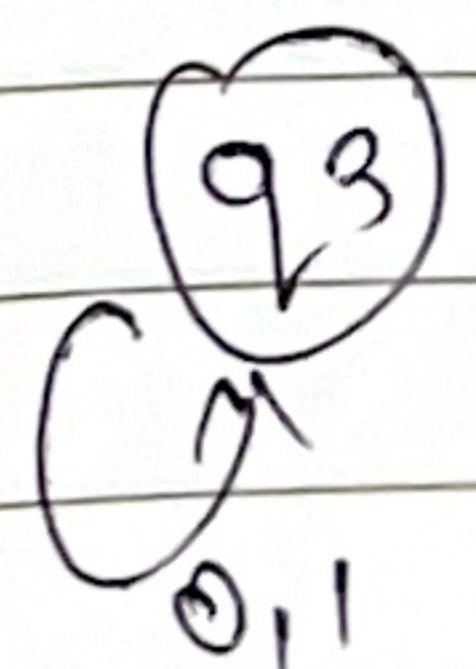
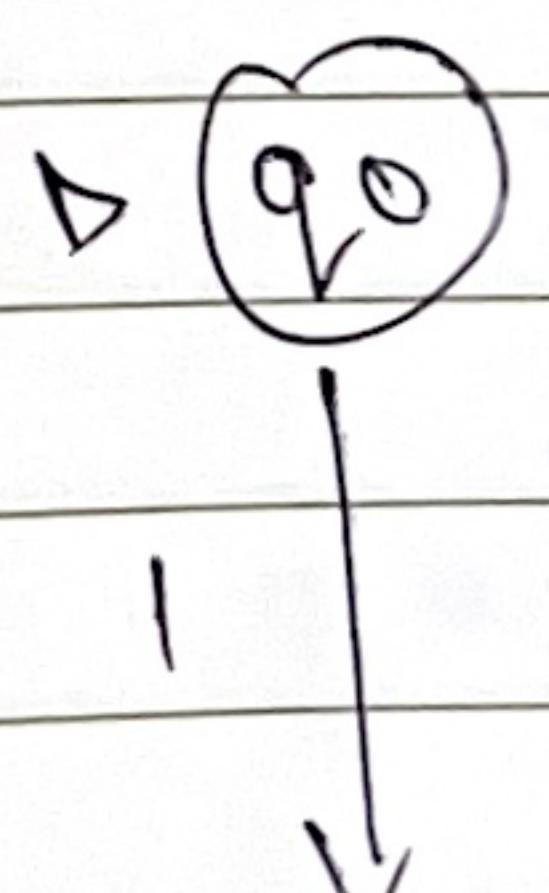
[FA] SET  
ENDING

[EXAMPLE]

INPUT - 101



REJECTED



Page No. :

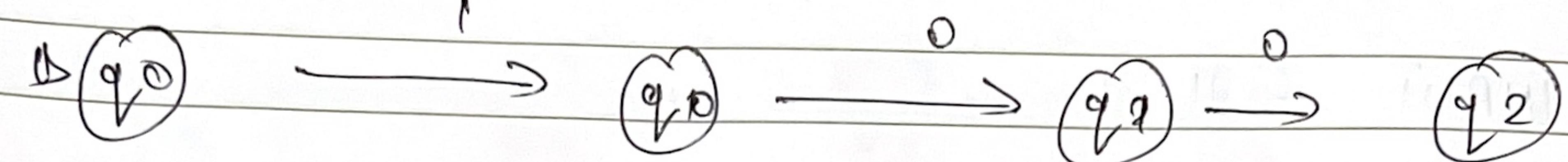
Date :

X. I. E.  
Mahim, Mumbai

Page No. :

Date :

INPUT - 100



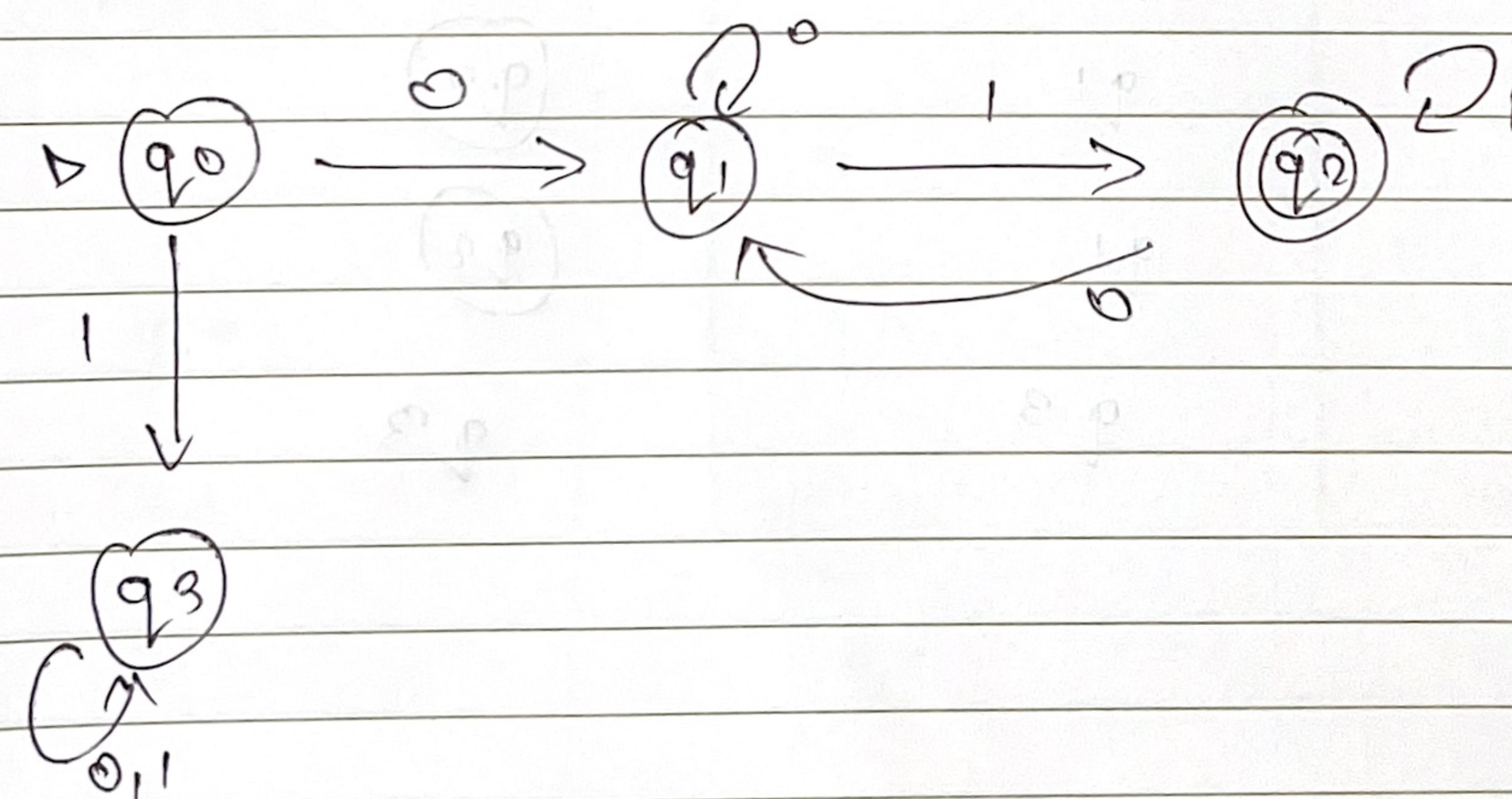
ACCEPTED

[TABLE]

	0	1	0
q0		q1	<del>q1</del> q0
q1		q2	<del>q2</del> q0
q2		q3	q0

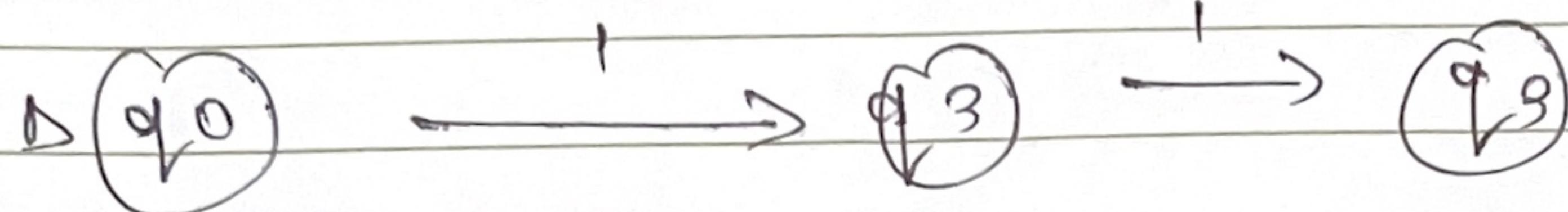
"00"]

[FA] SET OF STRINGS START WITH "0" AND  
ENDING WITH "1",  $\Sigma = \{0, 1\}$



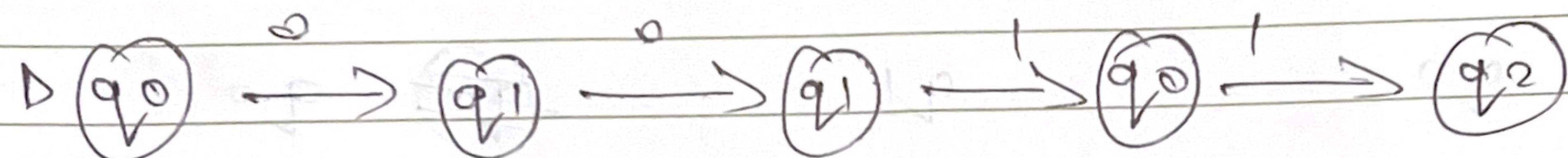
[EXAMPLE]

INPUT - 11



REJECTED

INPUT - 0011

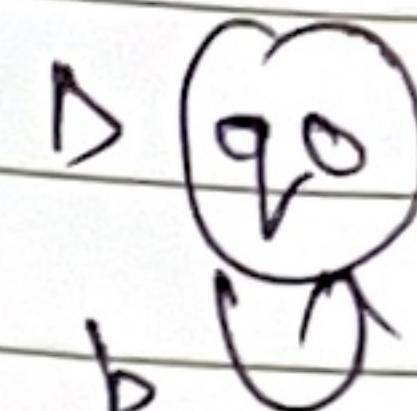


ACCEPTED

[TABLE]

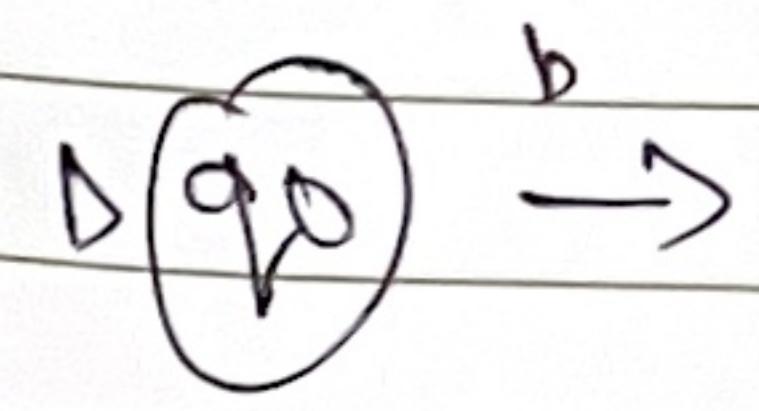
	0	1	
0	$q_0$	$q_1$	$q_2$
1	$q_1$	$q_0$	$q_3$
$q_0$			$q_2$
$q_1$			$q_2$
$q_2$			
$q_3$			

[FA] WITH



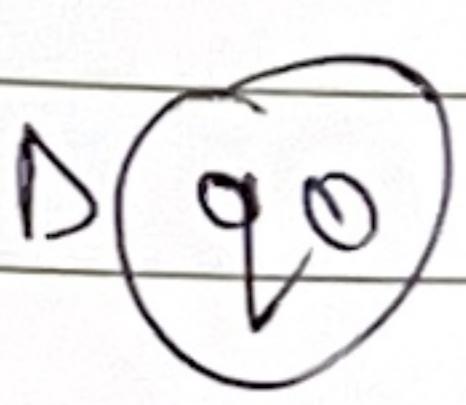
[EXAMPLE]

INPUT -



ACCEPTED

INPUT -



REJECTED

[TABLE]

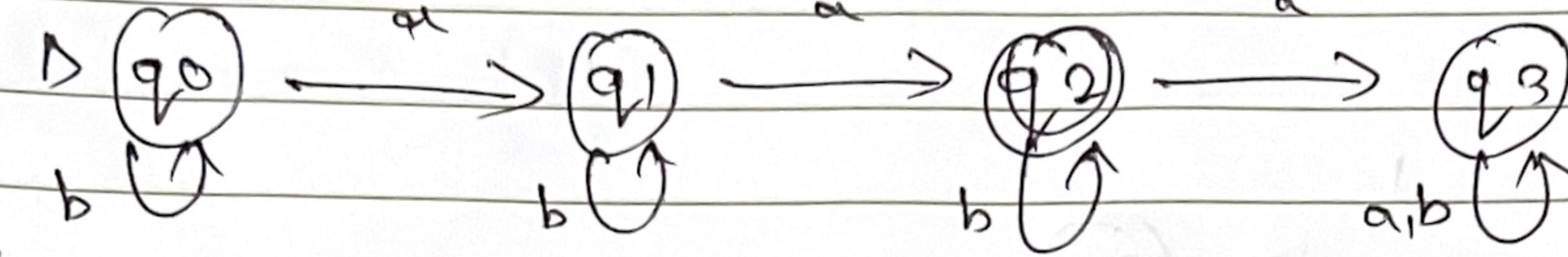
$q_0$

$q_1$

$q_2$

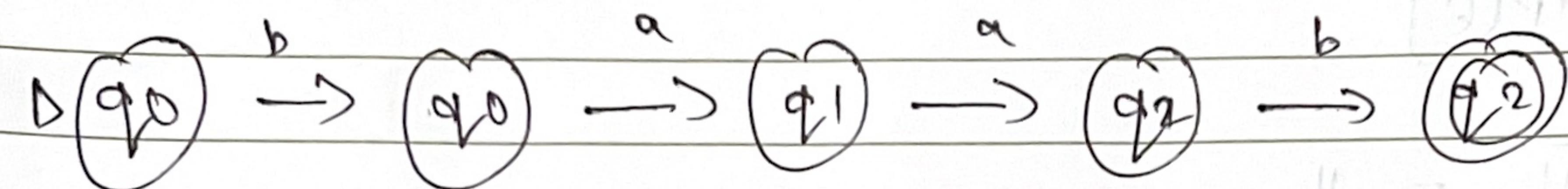
$q_3$

[FA WITH EXACTLY "aa" ANYWHERE]



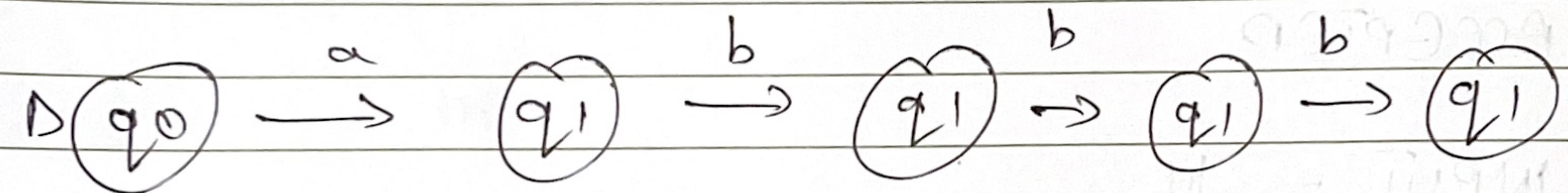
[EXAMPLE]

INPUT - babb



ACCEPTED

INPUT - abbb



REJECTED

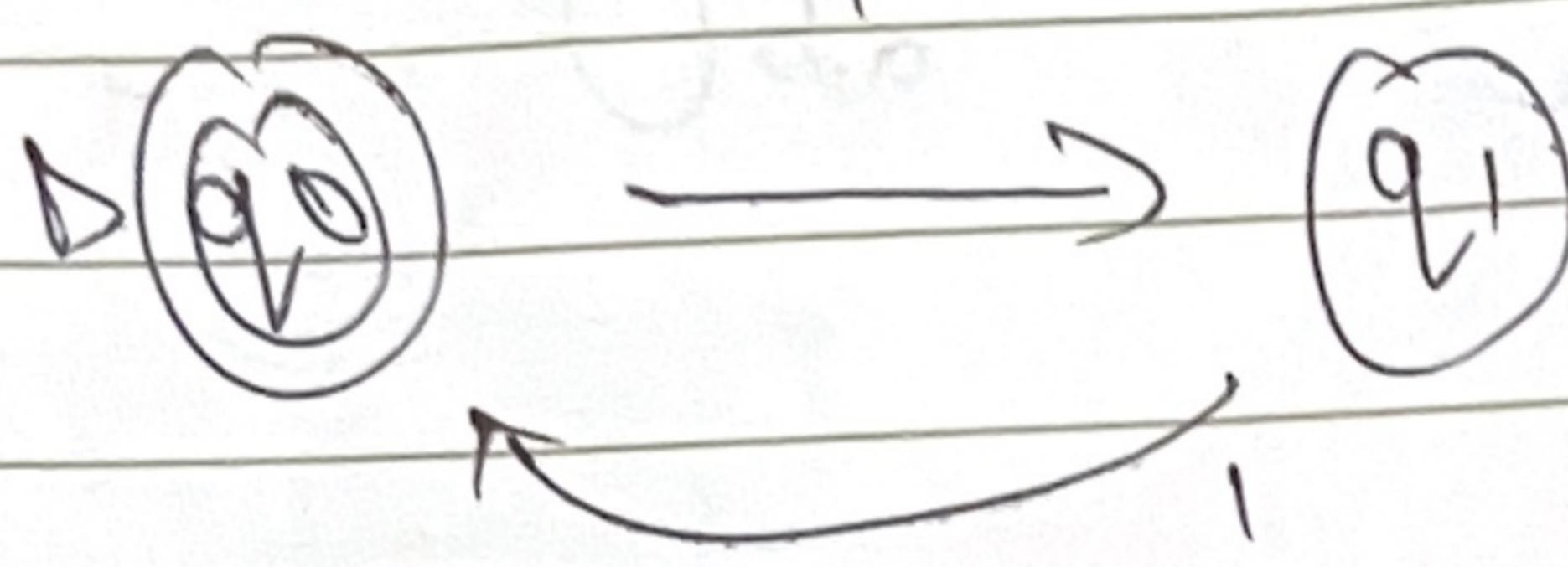
[TABLE]

	a	b
$q^0$	$q^1$	$q^0$
$q^1$	$q^2$	$q^1$
$q^2$	$q^3$	$q^2$
$q^3$	$q^3$	$q^3$

(FA)

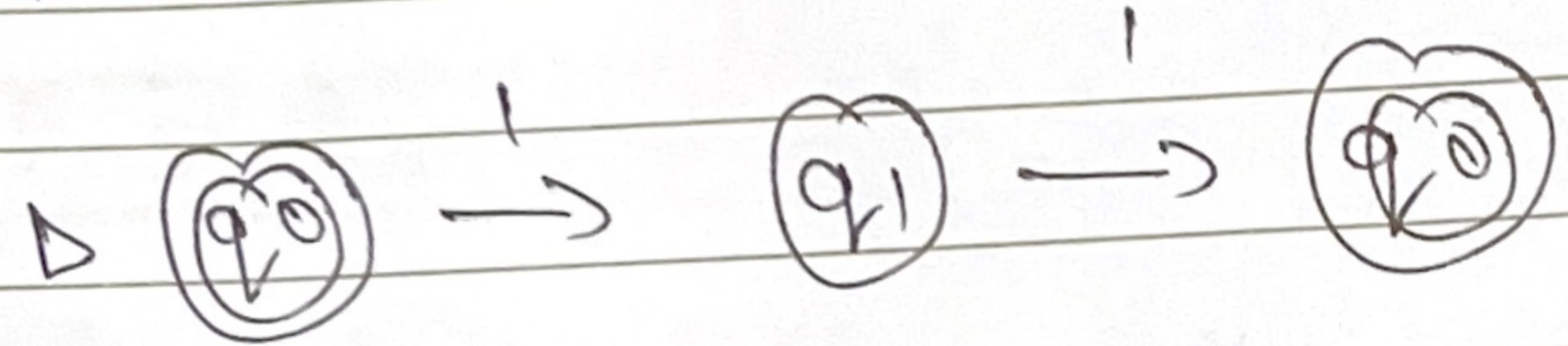
UNARY NUMBER DIVISIBLE BY 2, 3, 4

BY 2



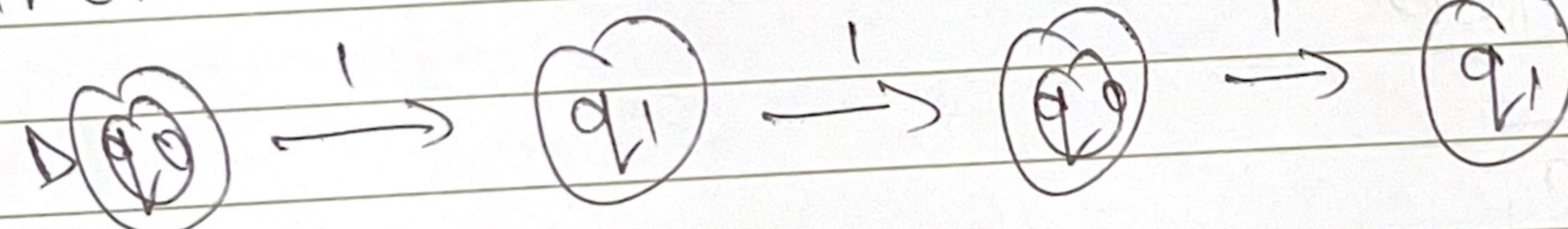
[EXAMPLE]

INPUT - //



ACCEPTED

INPUT - //



REJECTED

[TABLE]

q<sup>0</sup>

q<sup>1</sup>

q<sup>1</sup>

q<sup>0</sup>

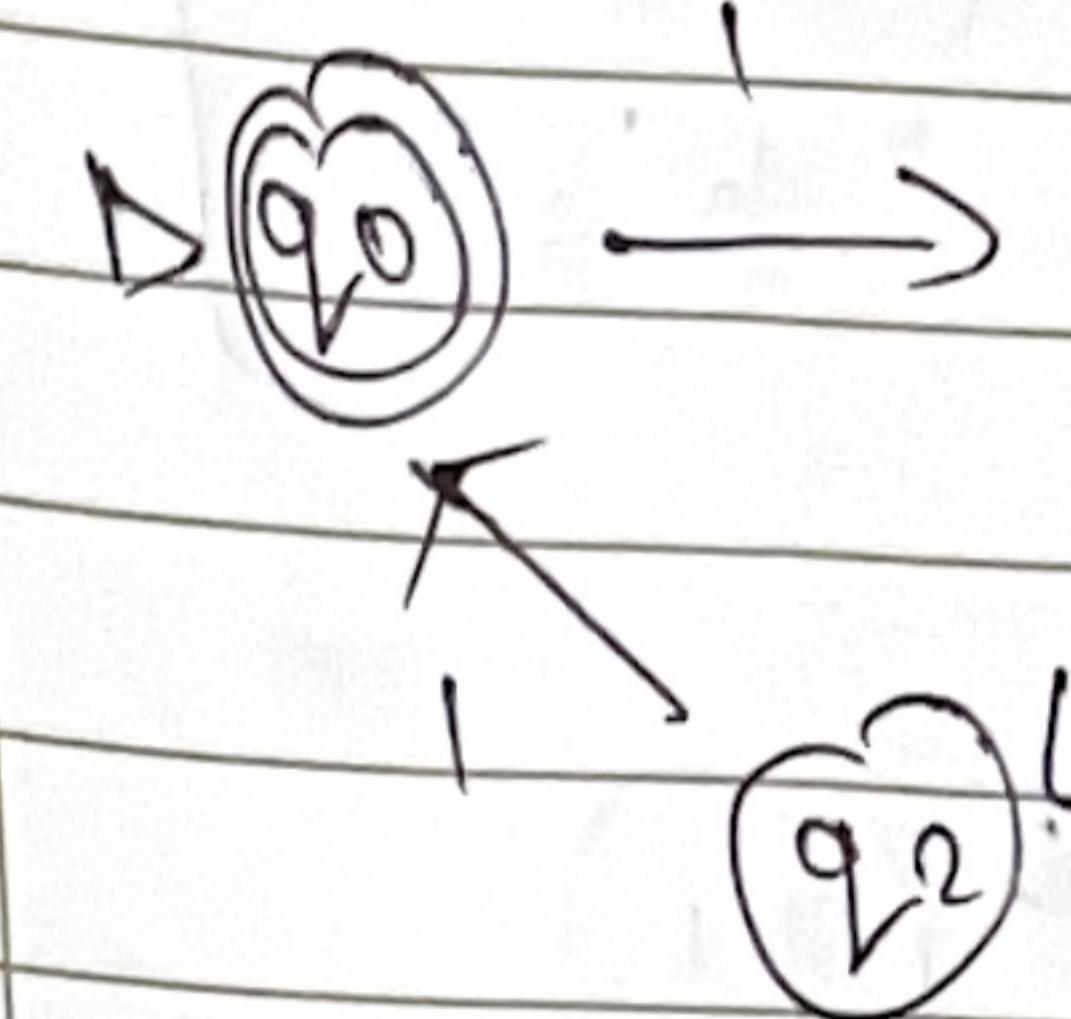
q<sup>0</sup>

q<sup>1</sup>

q<sup>2</sup>

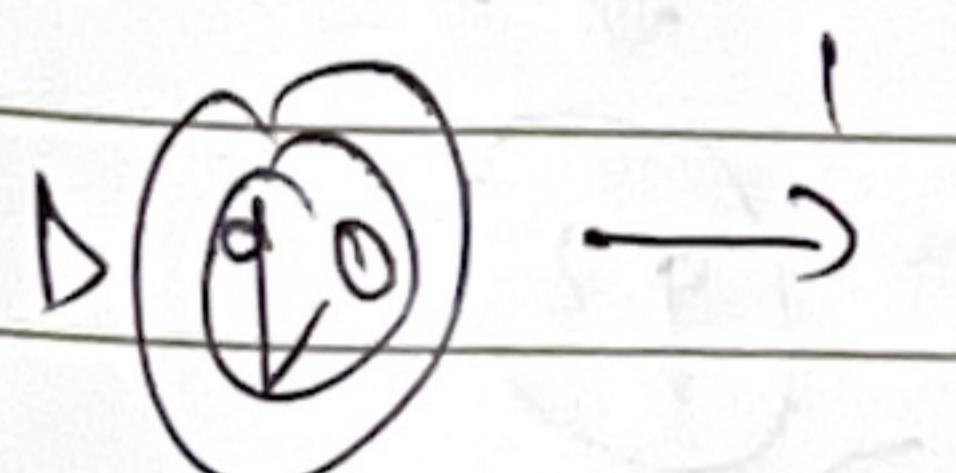
q<sup>2</sup>

BY 3



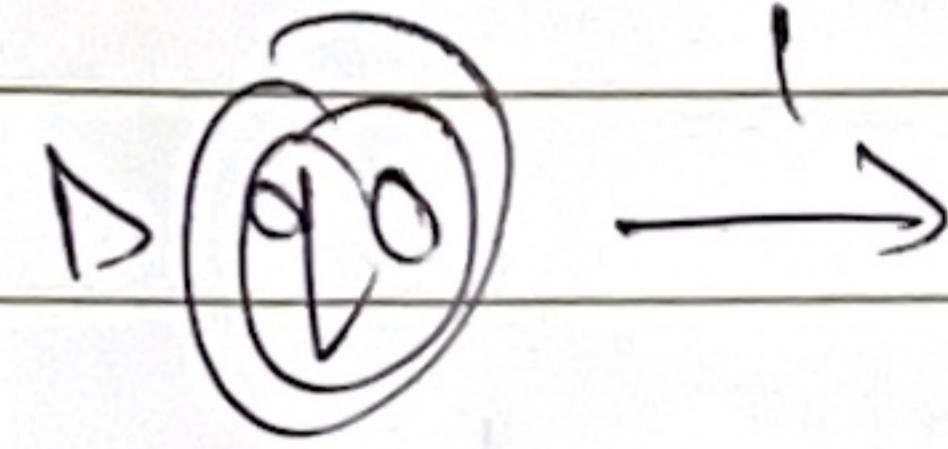
[EXAMPLE]

INPUT - //



REJECTED

INPUT - //



ACCEPTED

Page No. :

Date :

# X. I. E.

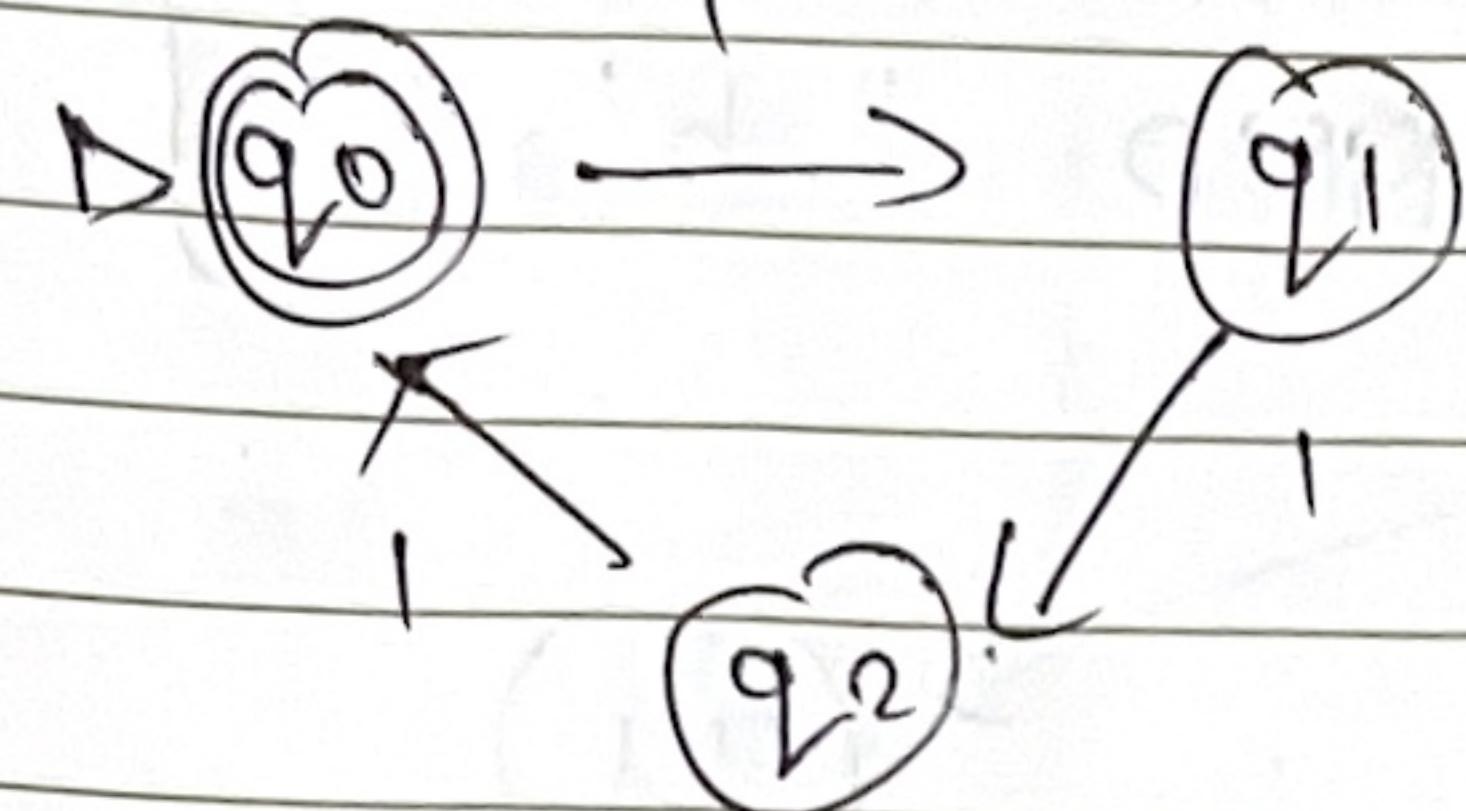
Mahim, Mumbai

Page No. :

Date :

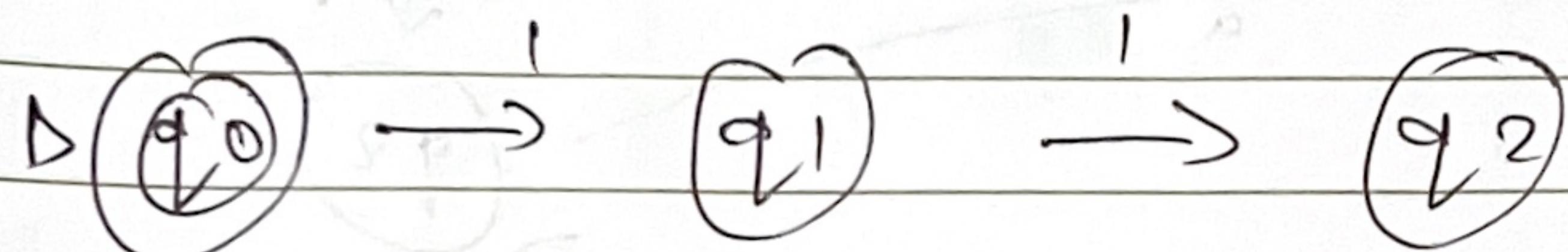
BY 2, 3, 4

BY 3



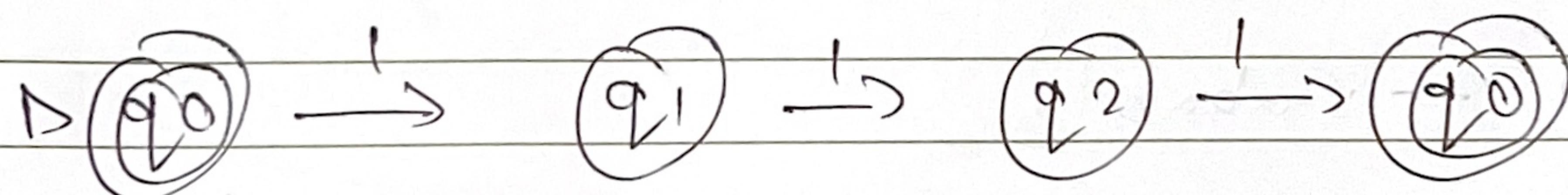
[EXAMPLE]

INPUT - 11



REJECTED

INPUT - 111



ACCEPTED

q<sup>0</sup>

q<sup>1</sup>

q<sup>2</sup>

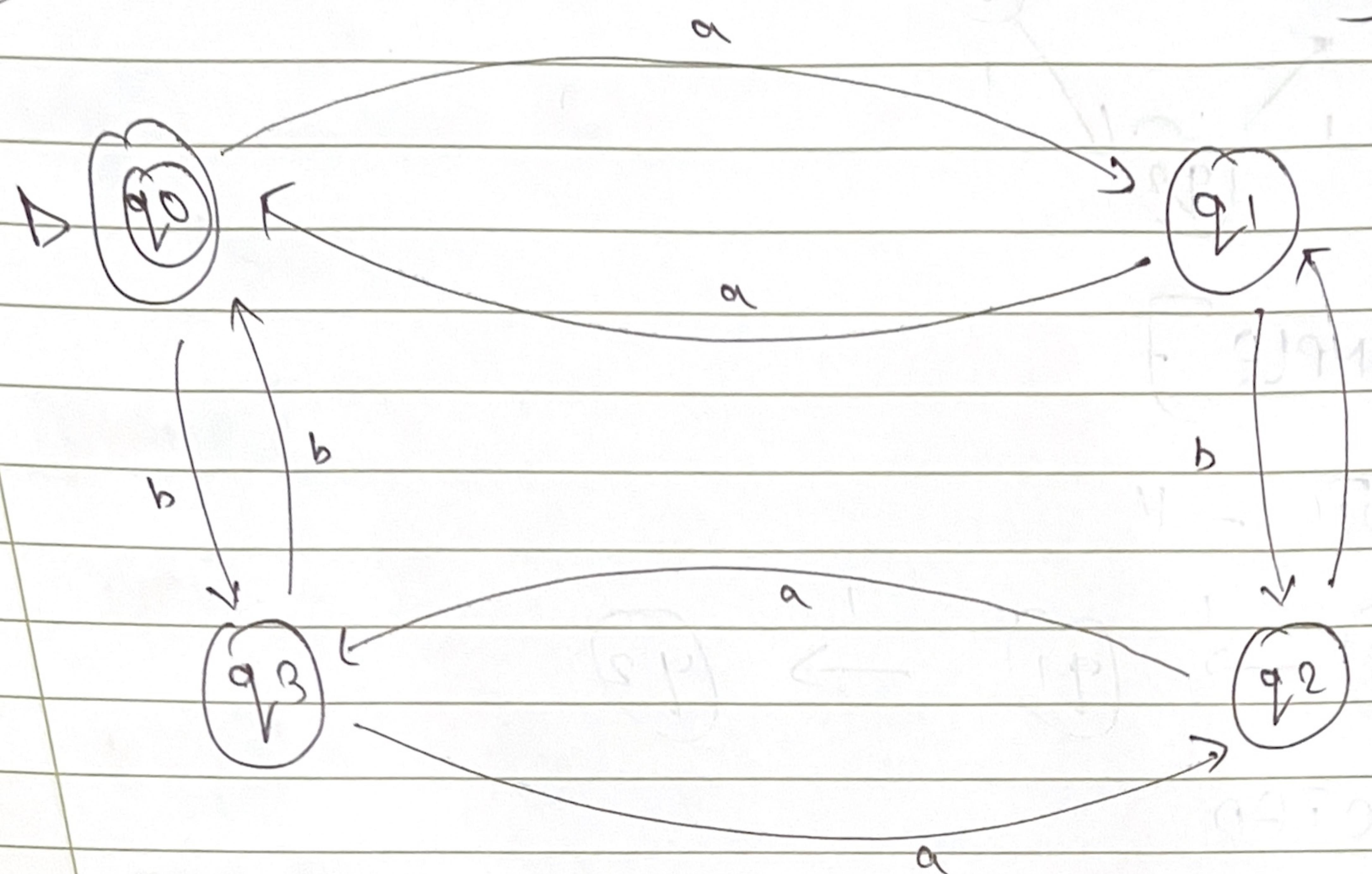
q<sup>1</sup>

q<sup>2</sup>

q<sup>0</sup>

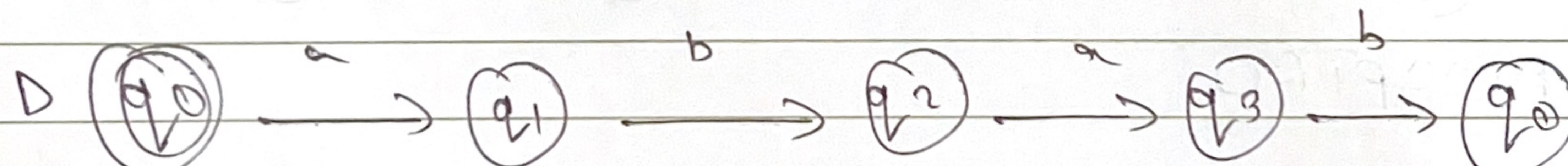
TABLE

(FA) FOR ALL STRING OVER THE ALPHABET  $\Sigma = \{a, b\}$  WITH EVEN NUMBER OF "a's" AND "b's"



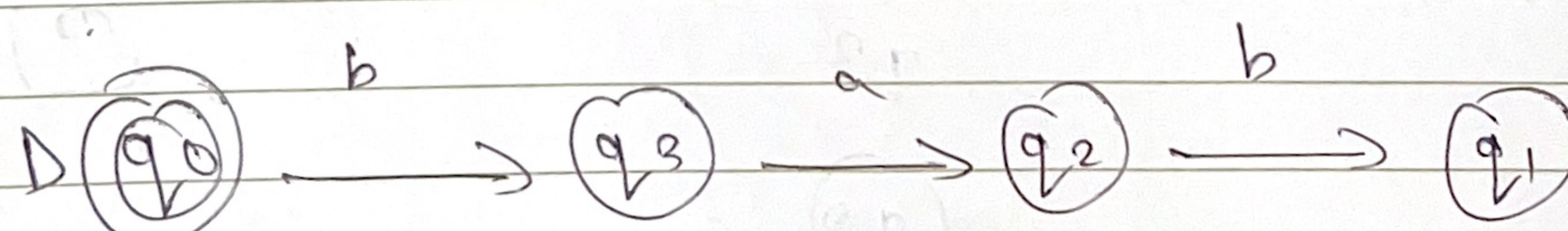
[EXAMPLE]

INPUT - abab



ACCEPTED

INPUT - bab



REJECTED

[TABLE]

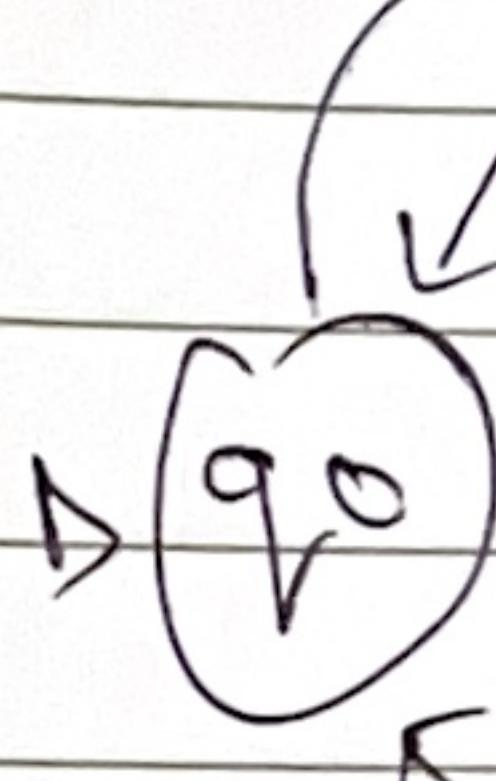
$q_0$

$q_1$

$q_2$

$q_3$

[FA] TO



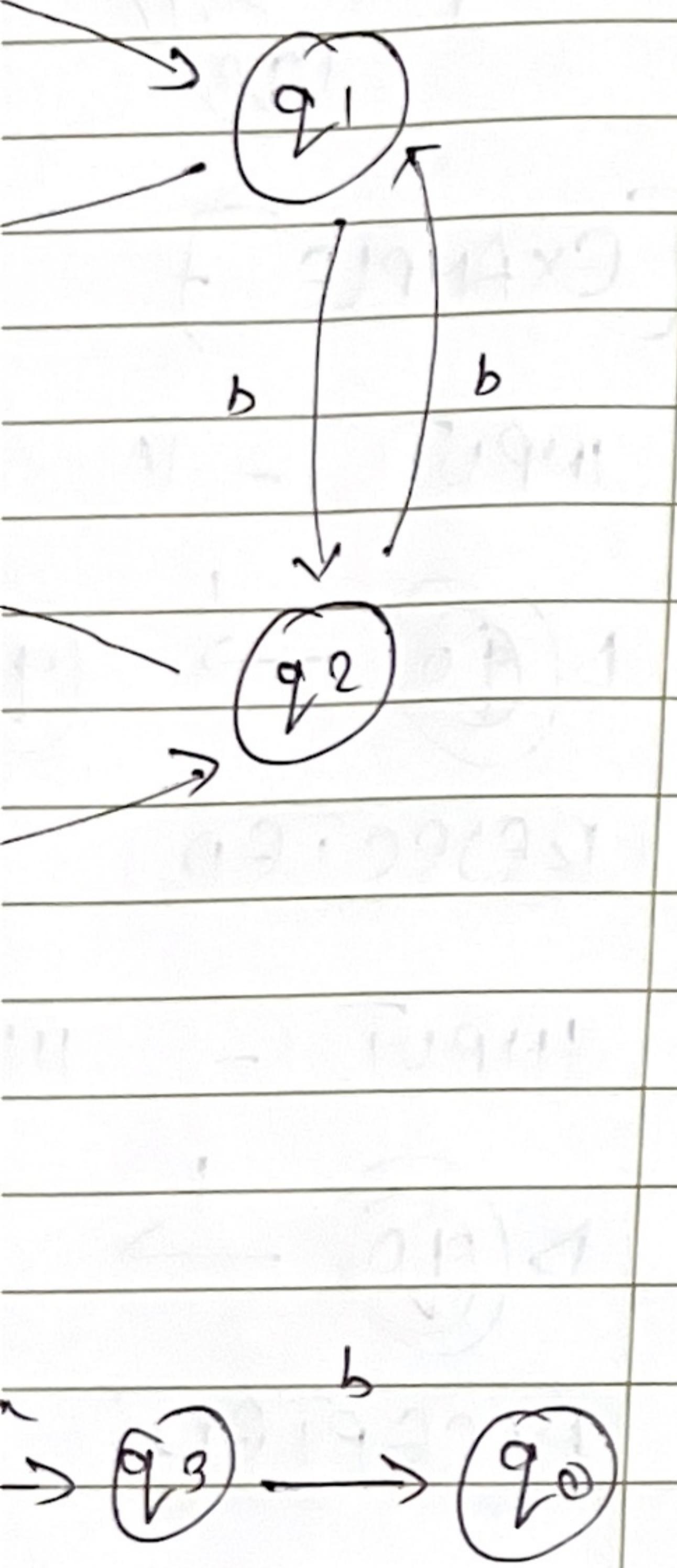
[EXAMPLE]

INPUT -



ACCEPTED

THE  
ITH EVEN  
ND " b's "

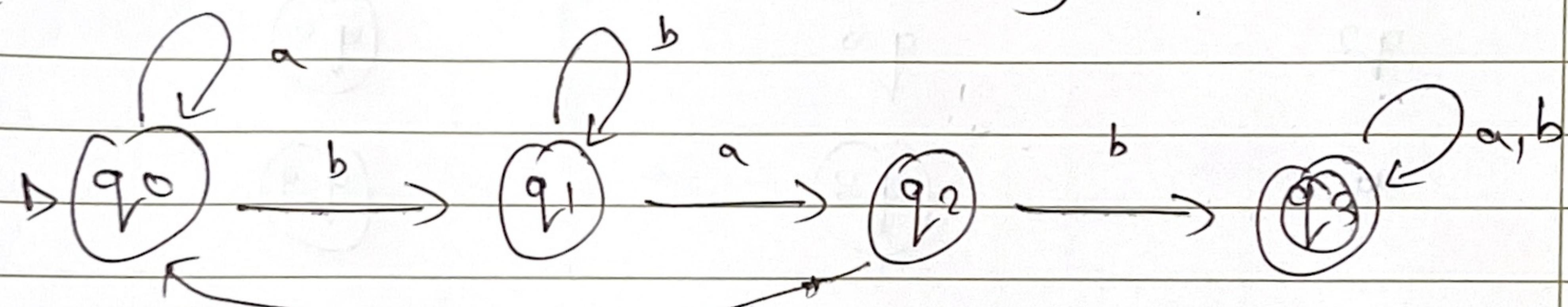


[TABLE]

a                      b

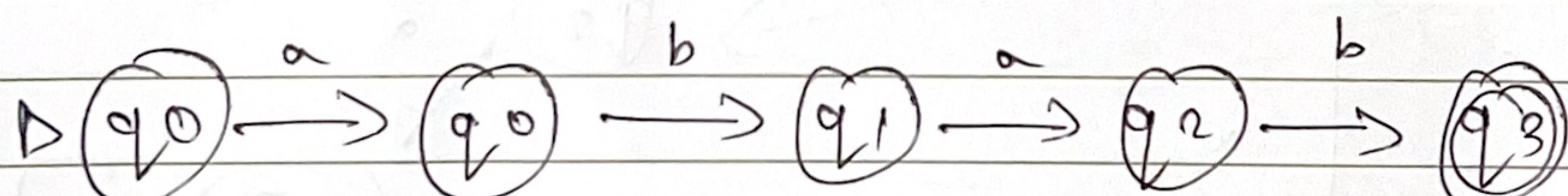
$q_0$	$q_1$	$q_3$
$q_1$	$q_0$	$q_2$
$q_2$	$q_3$	$q_1$
$q_3$	$q_2$	$q_0$

[FA] TO SEARCH FOR "bab"]  $\Sigma = \{a, b\}$



[EXAMPLE]

INPUT - abab



ACCEPTED

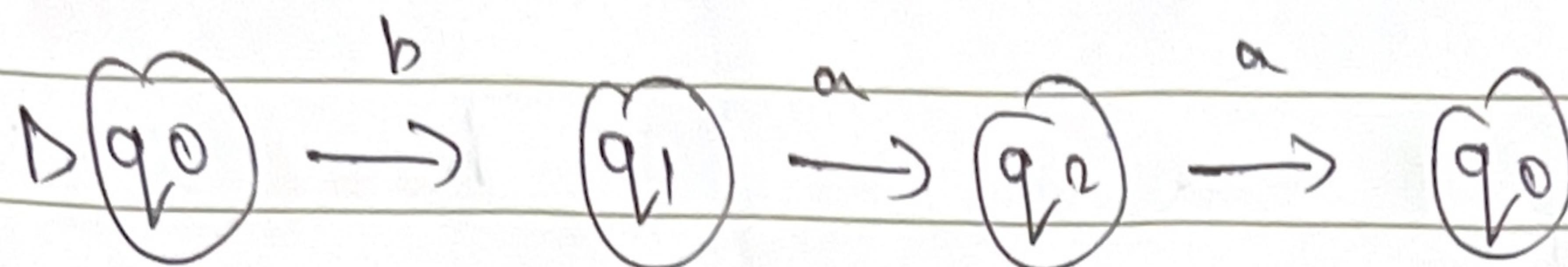
# X. I. E.

Mahim, Mumbai

Page No. :

Date :

INPUT - baa

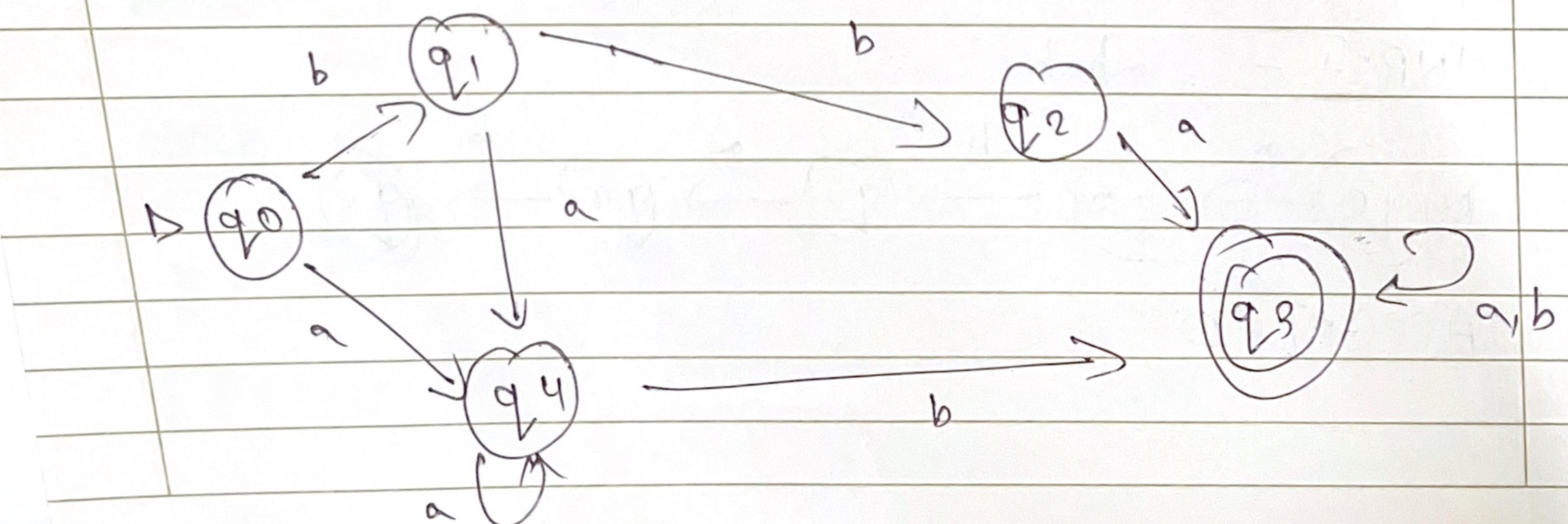


RECEIVED

# TABLE

	a	b
q <sub>0</sub>	q <sub>0</sub>	q <sub>1</sub>
q <sub>1</sub>	q <sub>2</sub>	q <sub>1</sub>
q <sub>2</sub>	q <sub>0</sub>	(q <sub>3</sub> )
q <sub>3</sub>	(q <sub>3</sub> )	(q <sub>3</sub> )

(FA) ACCEPTING STRINGS CONTAINING



Page No. :

Date :

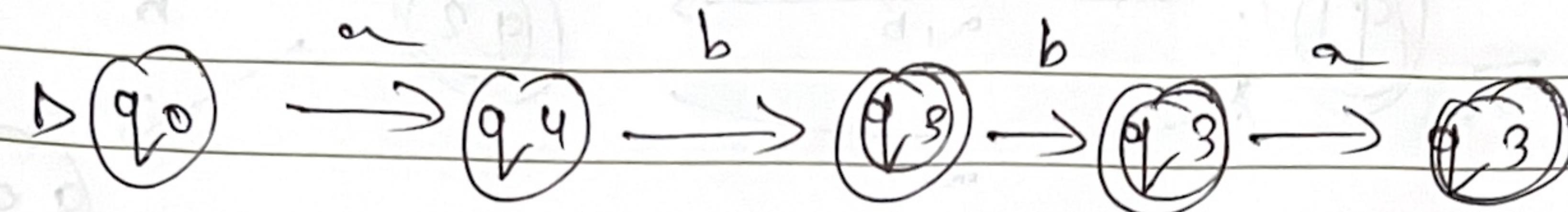
X. I. E.  
Mahim, Mumbai

Page No. :

Date :

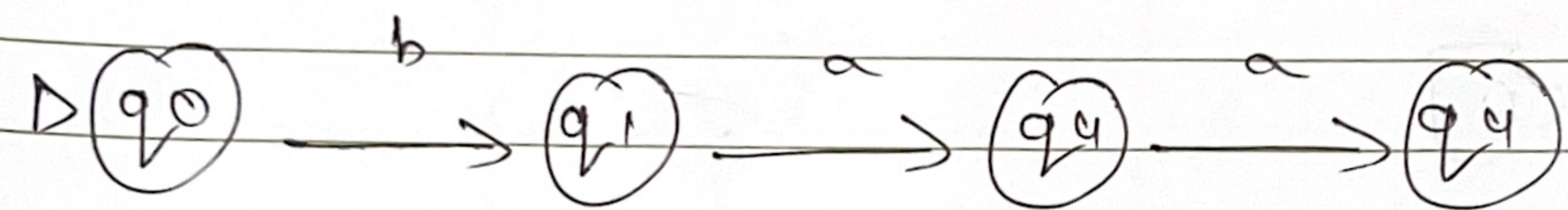
(EXAMPLE)

INPUT - abba



ACCEPTED

INPUT - baa



REJECTED

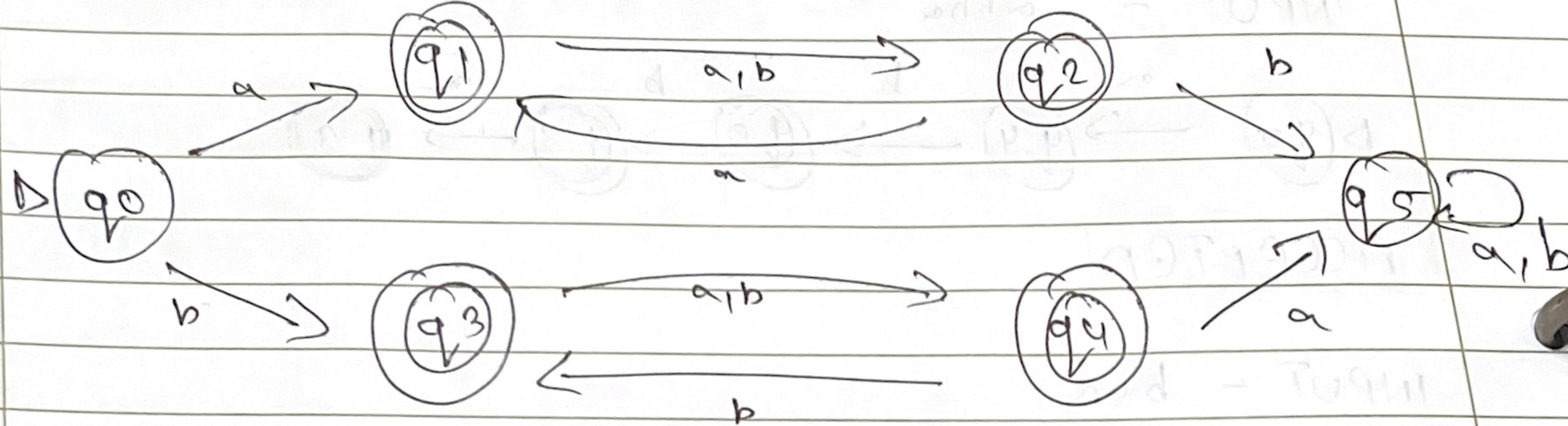
(TABLE)

a	b
$q_0$	$q_4$
$q_1$	$q_4$
$q^2$	$q_1$
$q^2$	$q^2$
$q^3$	$q_3$
$q^3$	$q^3$
$q^4$	$q_4$
$q^4$	$q_3$

a,b

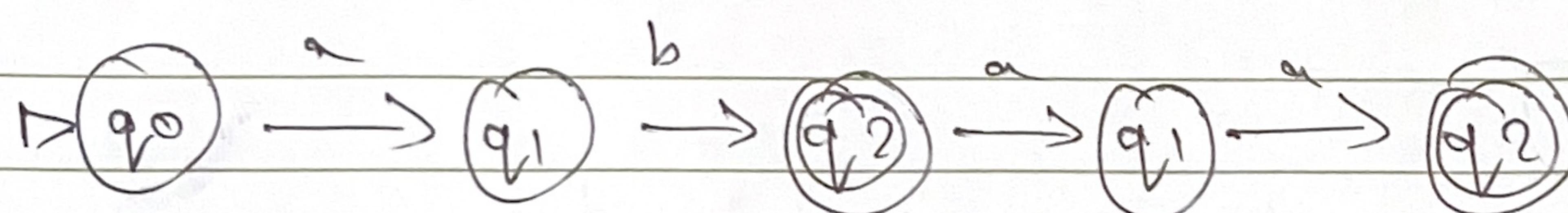
a,b

(FA) FOR SAME SYMBOL IN ALL ODD PLACES  $\Sigma = \{a, b\}$



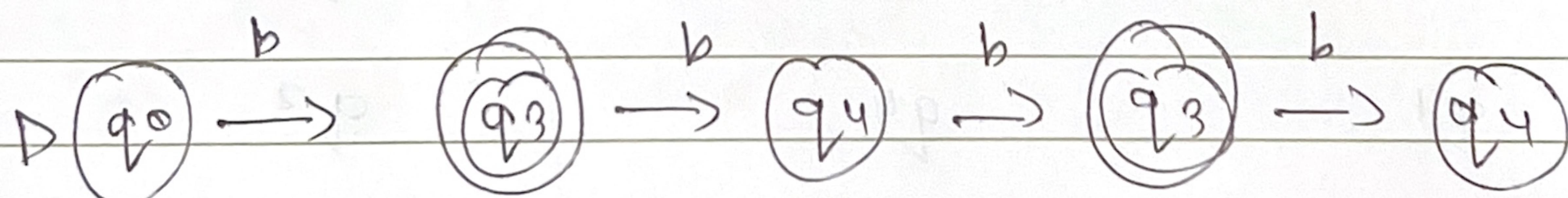
[EXAMPLE]

INPUT - abaa



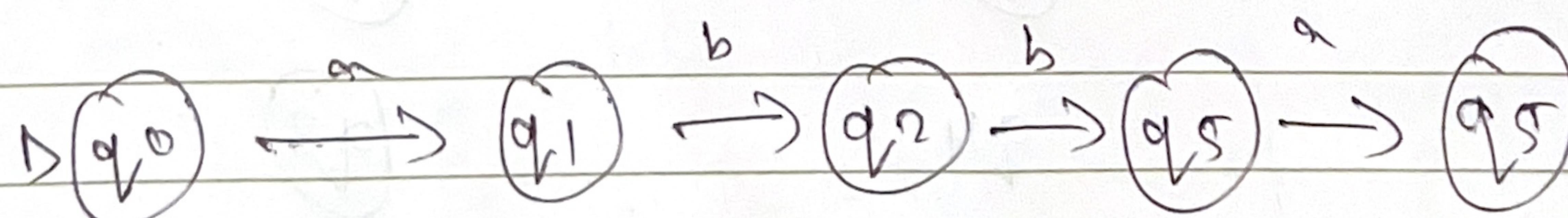
ACCEPTED

INPUT - bbbb



ACCEPTED

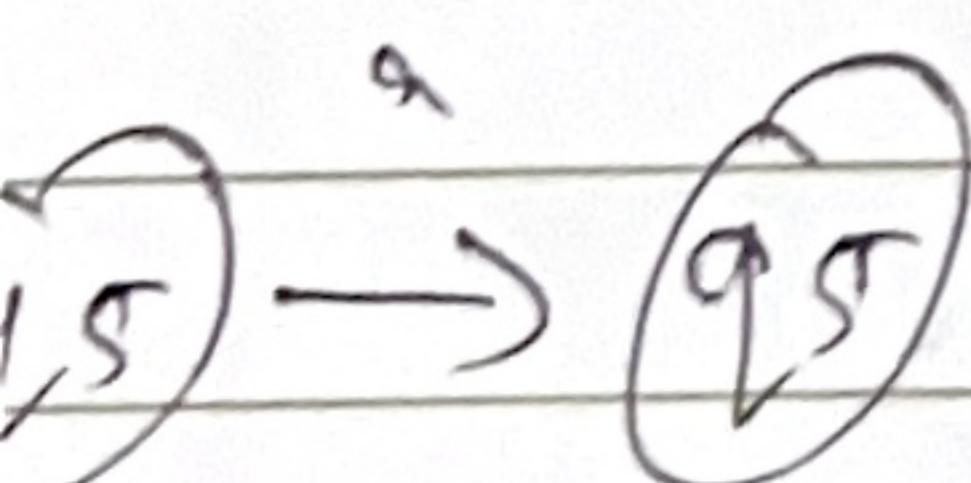
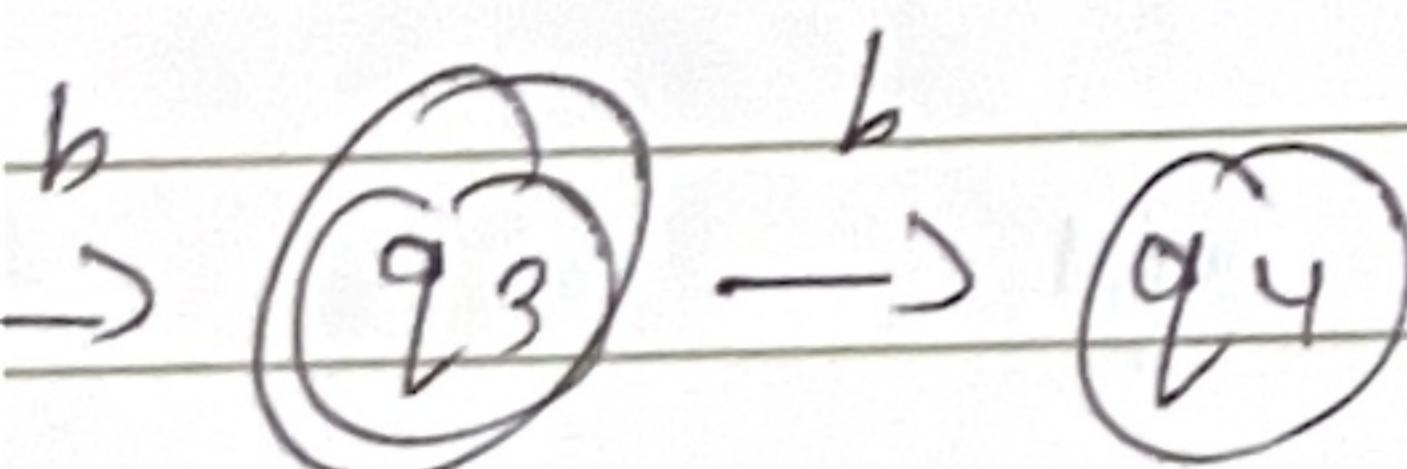
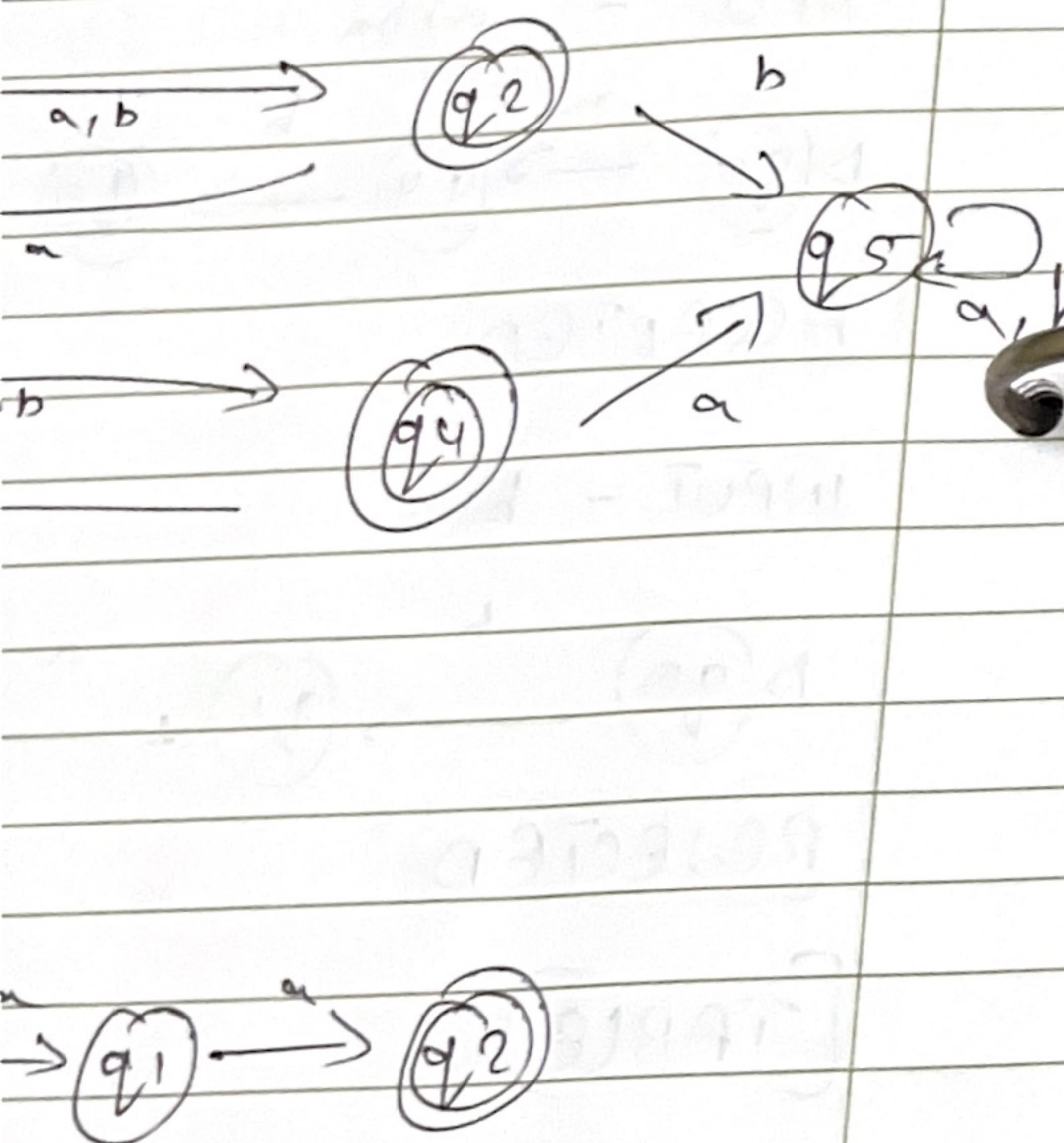
INPUT - aabbba



REJECTED

[TABLE]

NBOL IN ALL QDP  
, b]



[TABLE]

a	b
q <sub>1</sub>	q <sub>1</sub>
q <sub>2</sub>	q <sub>2</sub>
q <sub>3</sub>	q <sub>3</sub>
q <sub>4</sub>	q <sub>4</sub>
q <sub>5</sub>	q <sub>5</sub>