Automata & Computibility

Machine ↲ ↳ Compute + ability

Compute ability of machine

Automata is a computing device which follows a predetermined sequence of operations.

{DFA} Deterministic Finite Automata

Terminology

1. Symbol / Letter : a, b, c, A, B, C, 1, 2, 3, @, #, *

2. Alphabet : → Finite set of symbol
   → Σ (sigma)

   Ex $\Sigma = \{a, b, c\}$; $\Sigma = \{\#, *, @\}$; $\Sigma = \{1, 2\}$

3. String : (w) different combination and sequence of symbols

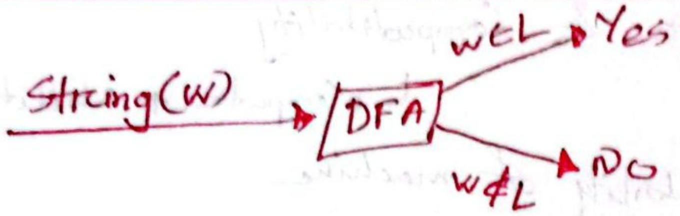
   . $\Sigma = \{0, 1\}$
   ↳ 0, 01, 10, 111,

4. Length of string $|w| = 4$

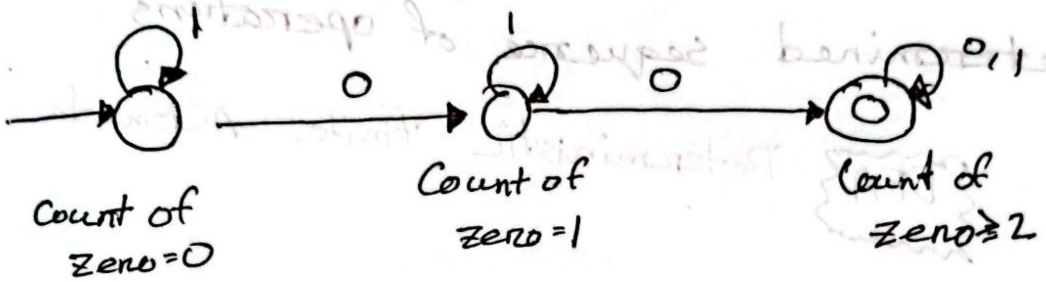
   Max $|w|$ = inf

   Min $|w| = 0$

   $w = \epsilon$; Empty string.

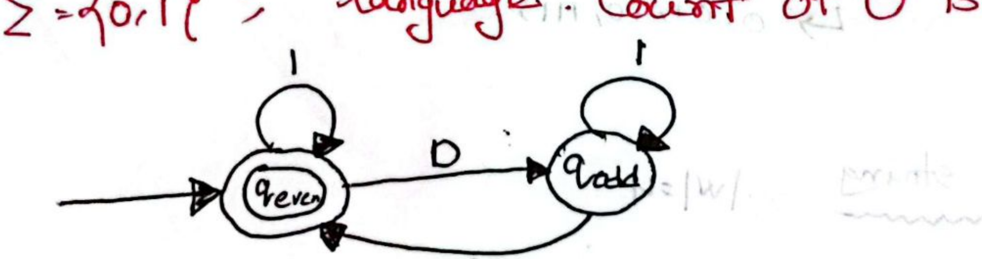


L = W contains at least two 0's

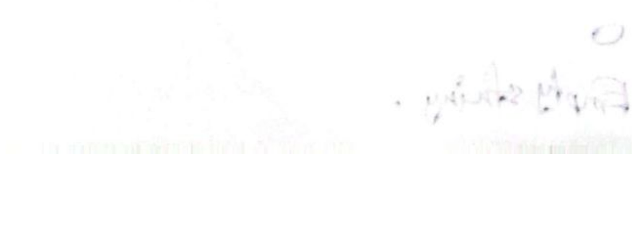


For each step, there will be 1 determined transition. That's why it's called Deterministic FA.

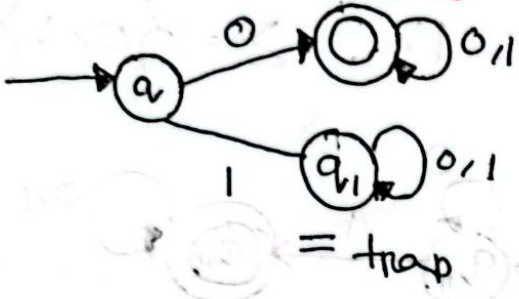
Σ = {0,1} ; language : String has at least Two 0's.



Σ = {0,1} ; language : Count of 0 is even.

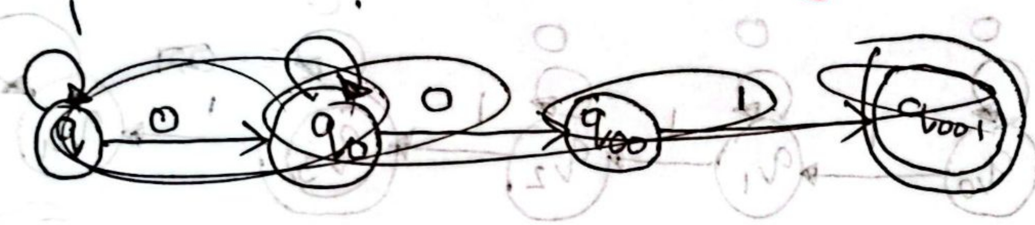


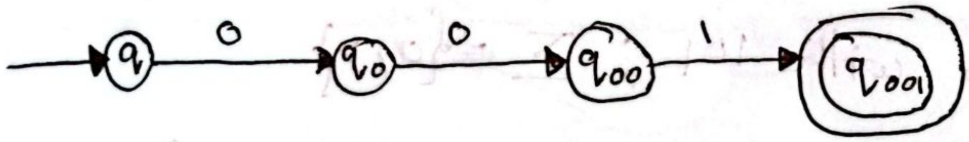
$\Sigma = \{0,1\}$ language : Starts with 0.



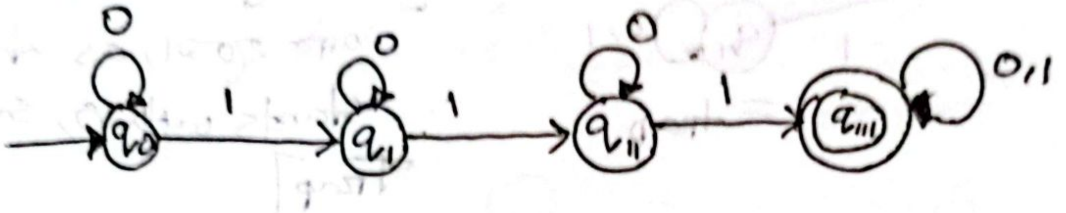
[0 পাইলেই এগোচ্ছি। 1 পাইলে তো আর হবে না, as statement, starts with 0, so, 1 পেলেই Trap]

$\Sigma = \{0,1\}$; language : String contains 001 as a substring.



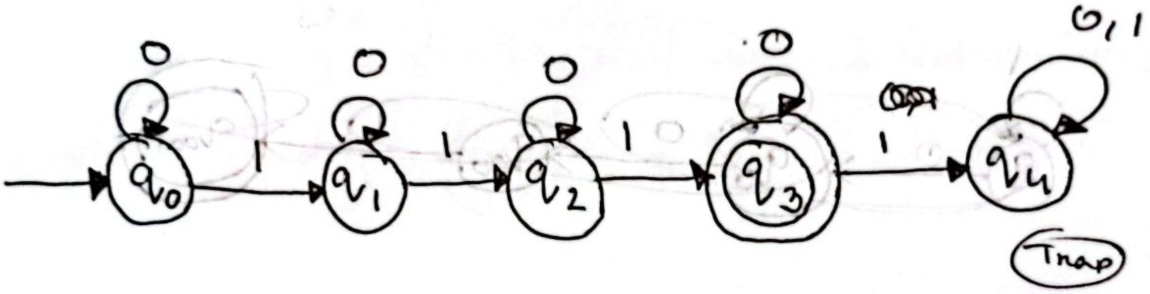


Draw a DFA for the set of strings that have at least three 1's. $\Sigma = \{0,1\}$



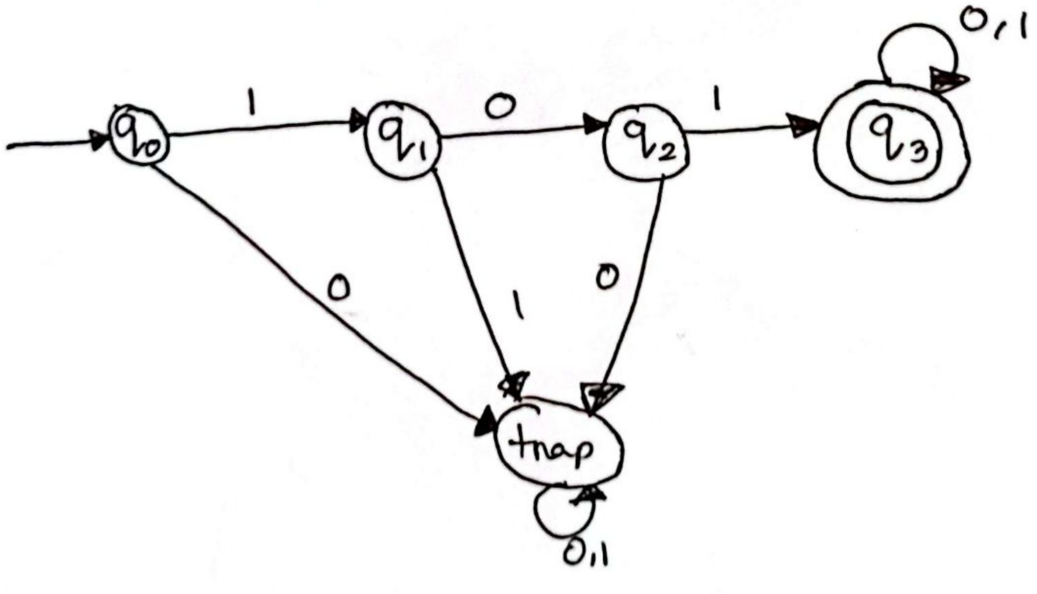
Exactly three 1's. $\Sigma = \{0,1\}$

00101000

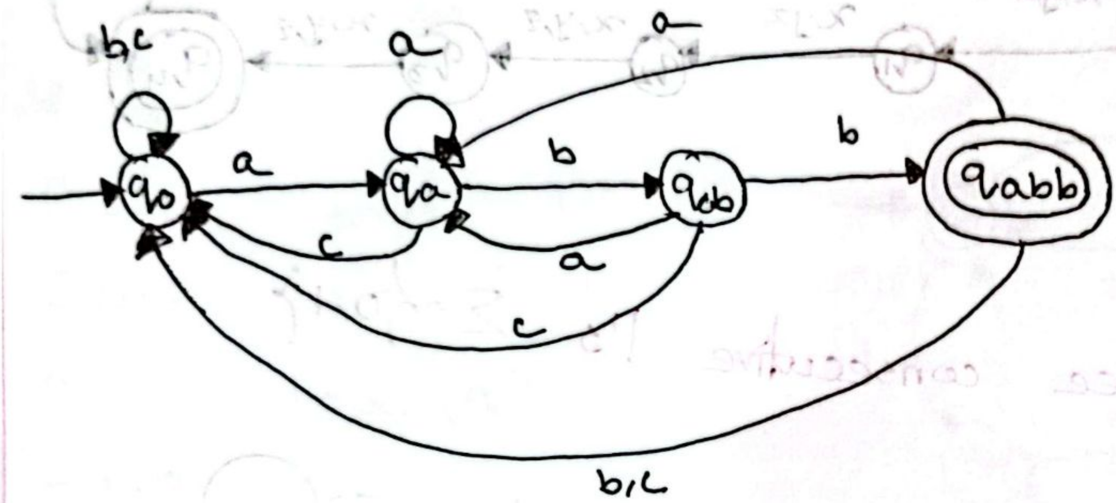


Starts with 101 ; $\Sigma = \{0,1\}$

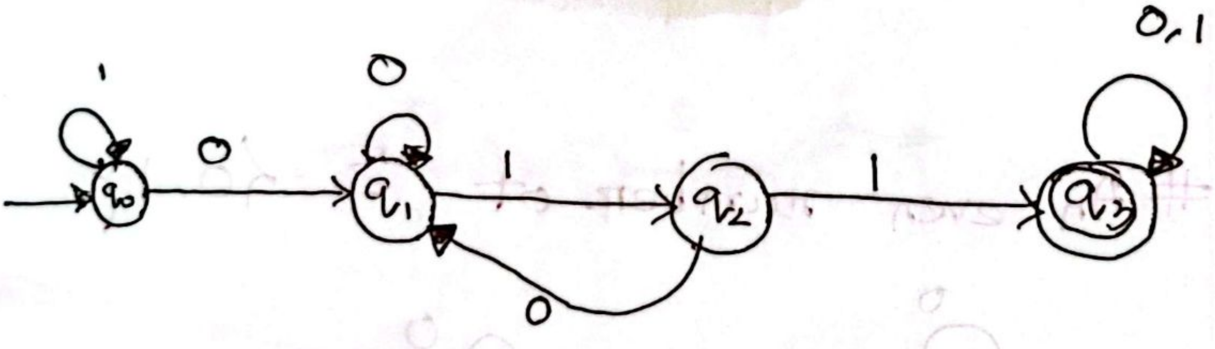
101-----



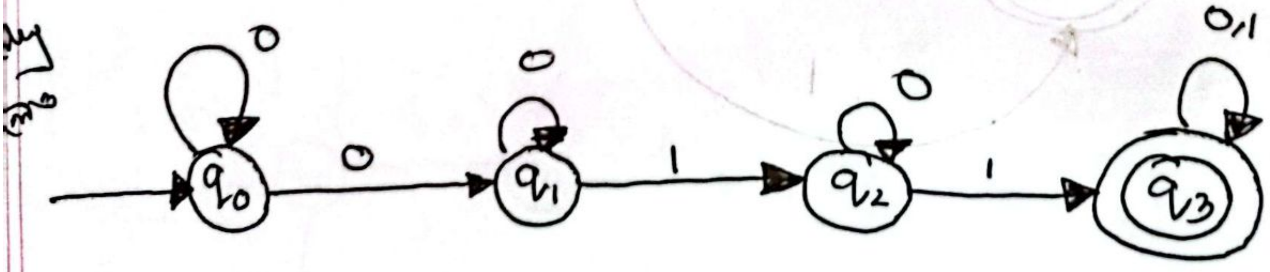
Ends with abb ; $\Sigma = \{a,b,c\}$



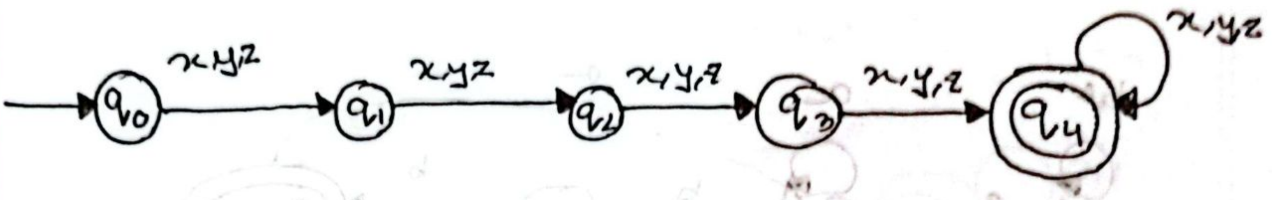
011 as a substring. $\Sigma = \{0,1\}$



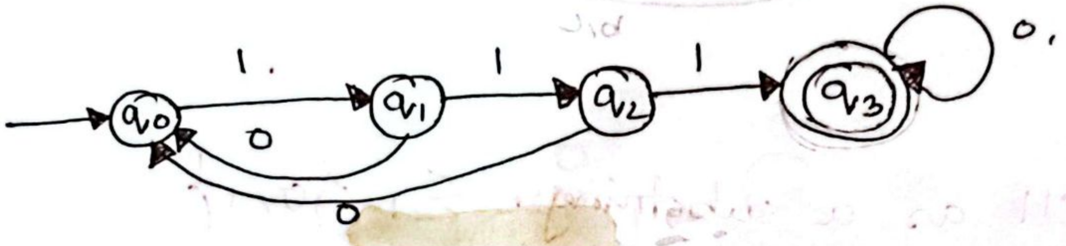
011 as a subsequence, $\Sigma = \{0,1\}$



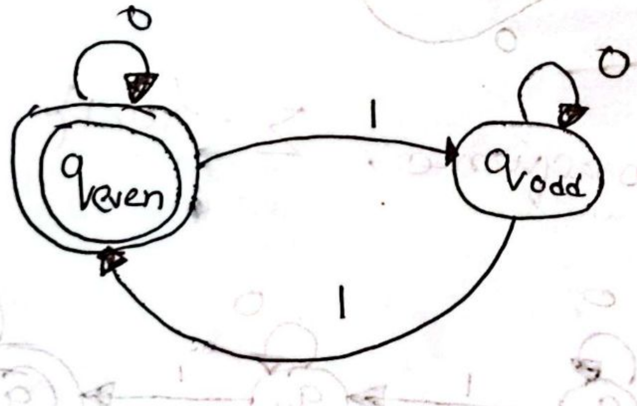
length of at least 4 ; Σ = {x, y, z}



Three consecutive 1's Σ = {0,1}



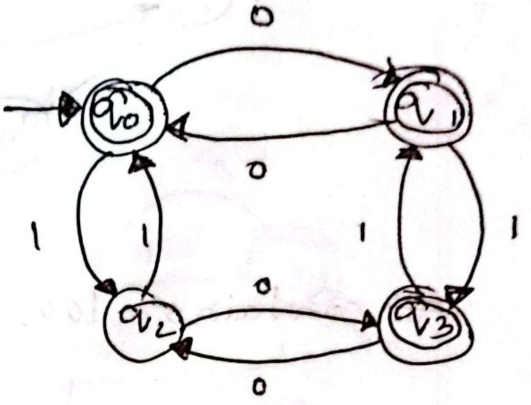
An even number of Σ = {0,1}



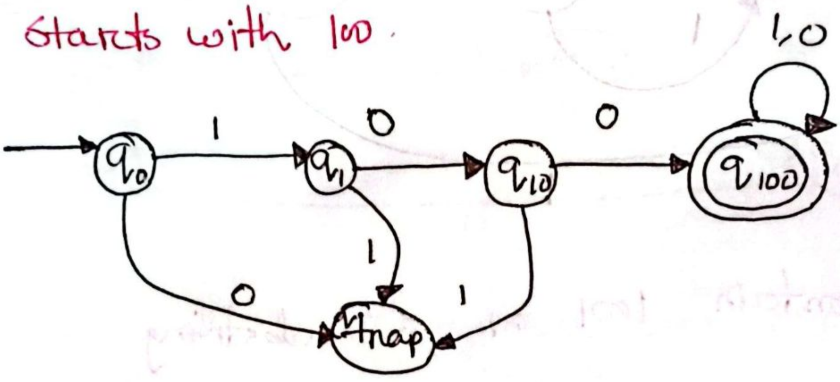
#An even number of 1's or an odd number of 0's $\Sigma = \{0,1\}$

Cases

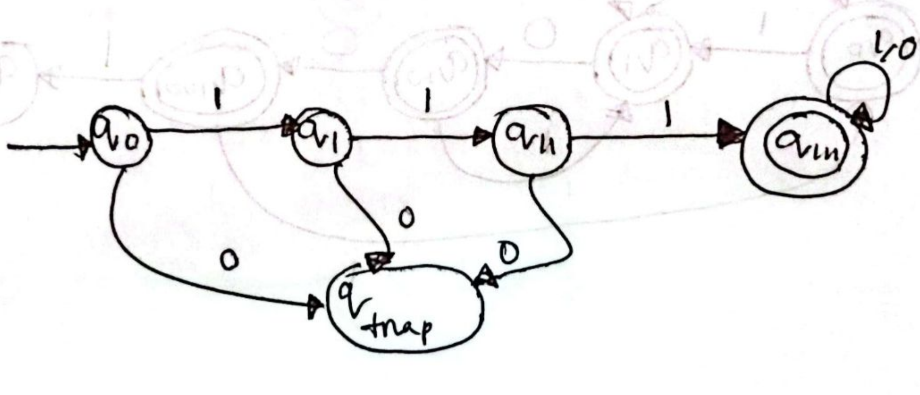
0 even	1 even	q_0	✓
0 odd	1 even	q_1	✓
0 even	1 odd	q_2	
0 odd	1 odd	q_3	✓



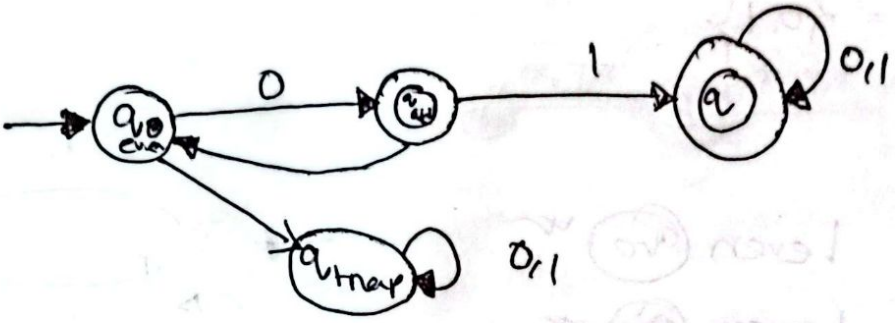
Starts with 100.



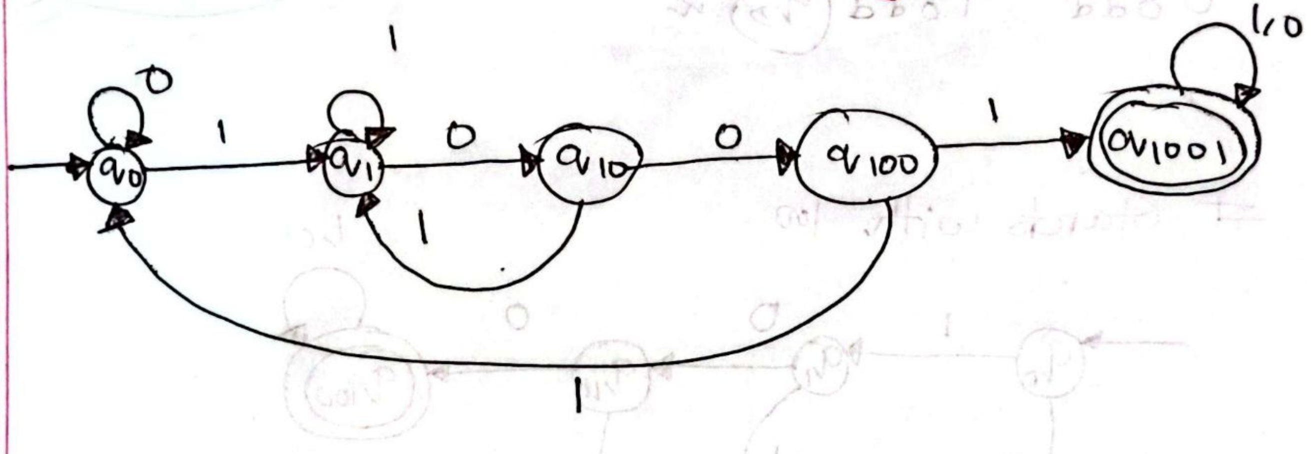
Starts with at least three 1's.



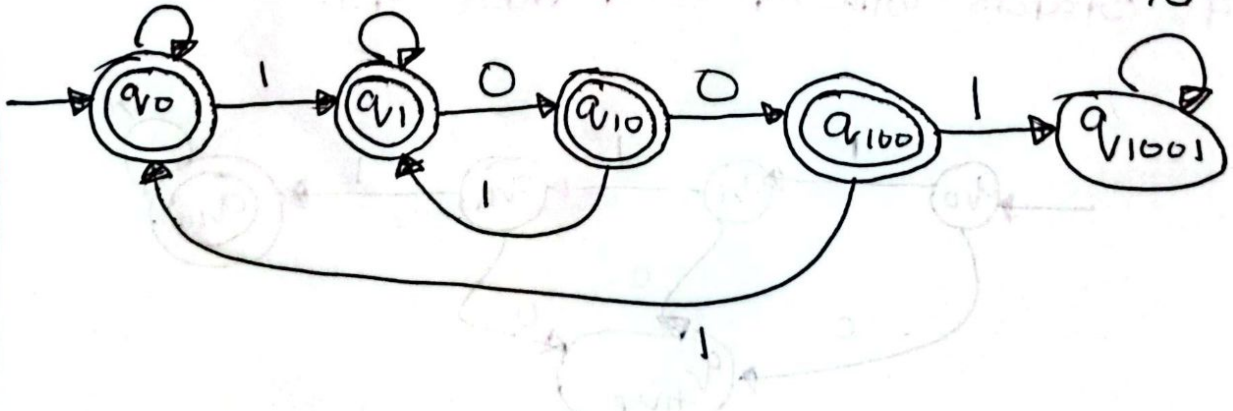
Start with odd number of 0's



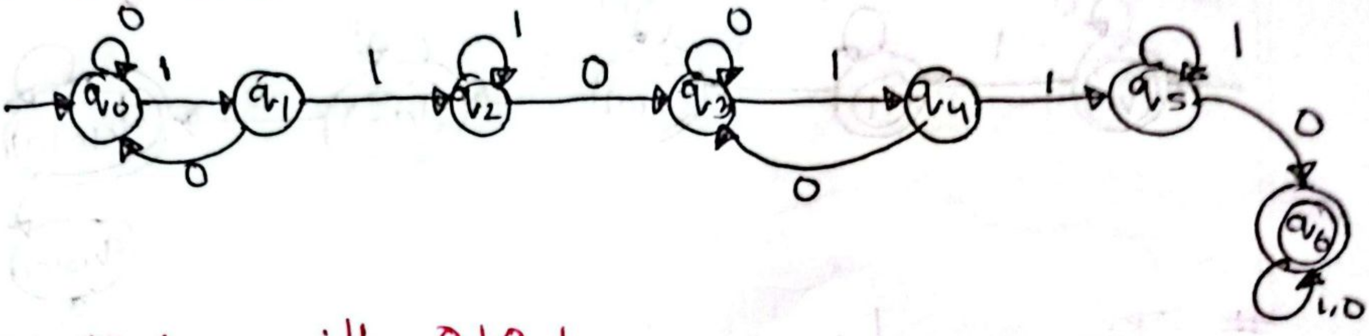
contains 1001 as a substring



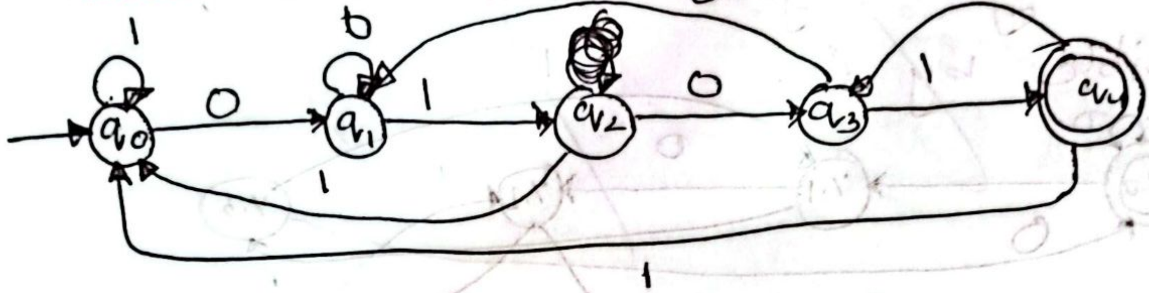
Do not contain 1001 as a substring



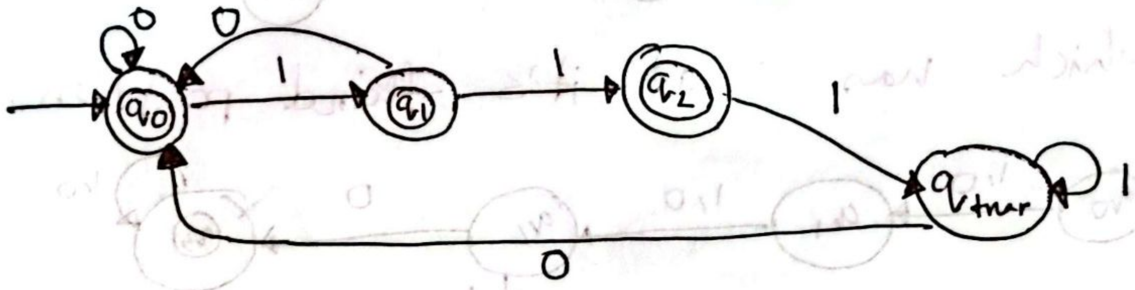
At least 2 occurrences of 110



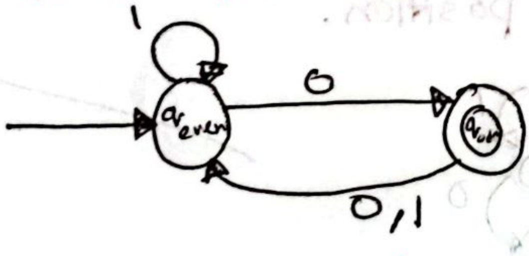
Ends with 0101



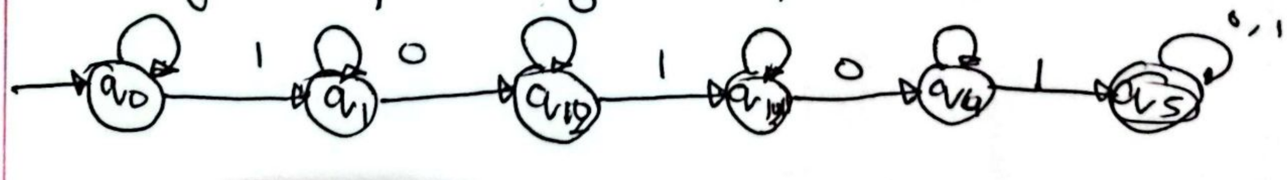
Ends with at most two 1's



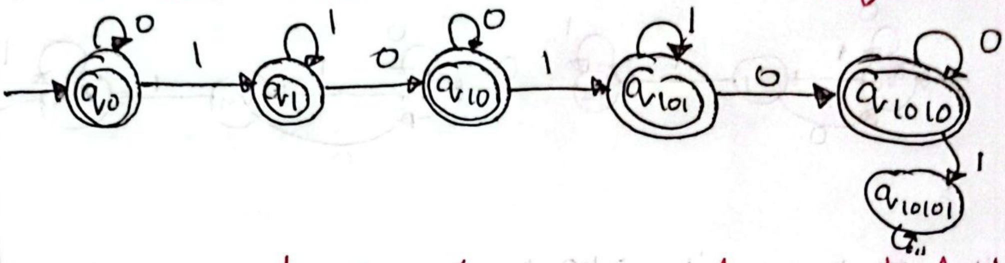
Ends with odd number of 0's



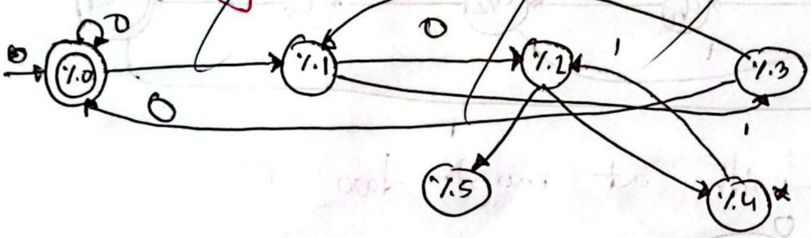
10101 as a subsequence



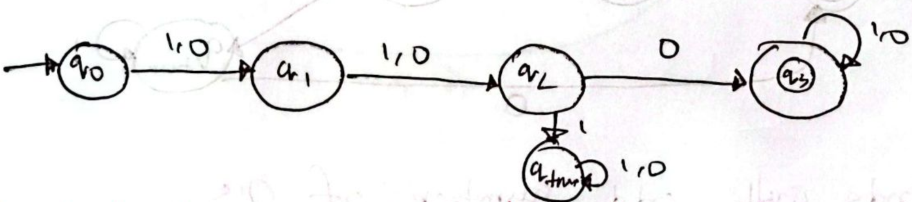
Do not have 10101 as a subsequence.



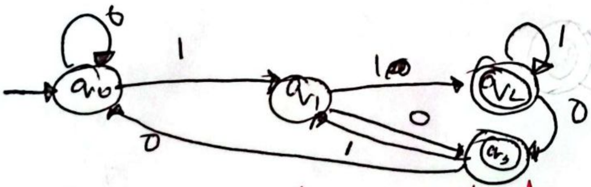
Binary strings whose decimal equivalent is divisible by 6.



which has 0 at it's third position.



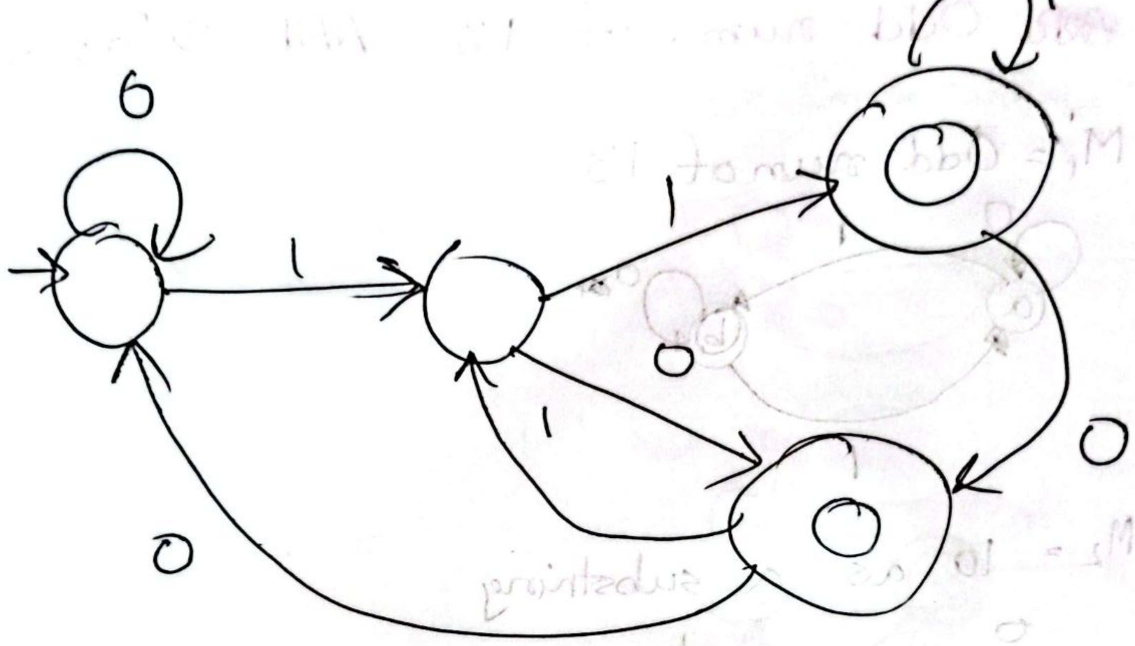
1 at it's second last position.



whose decimal equivalent is divisible by 8.

Decimal Equivalent এঃ, 0 পাইলে $= 2n$

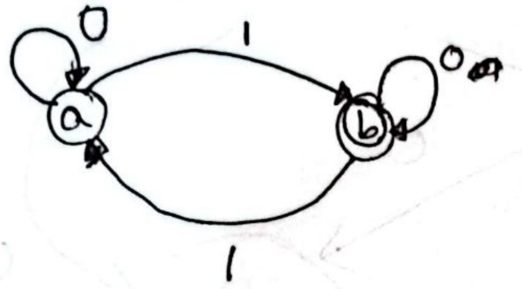
1 পাইলে $= 2n + 1$



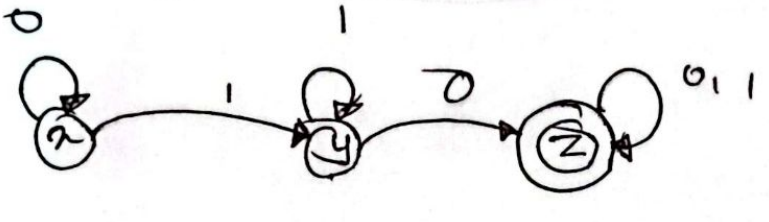
Gross Product

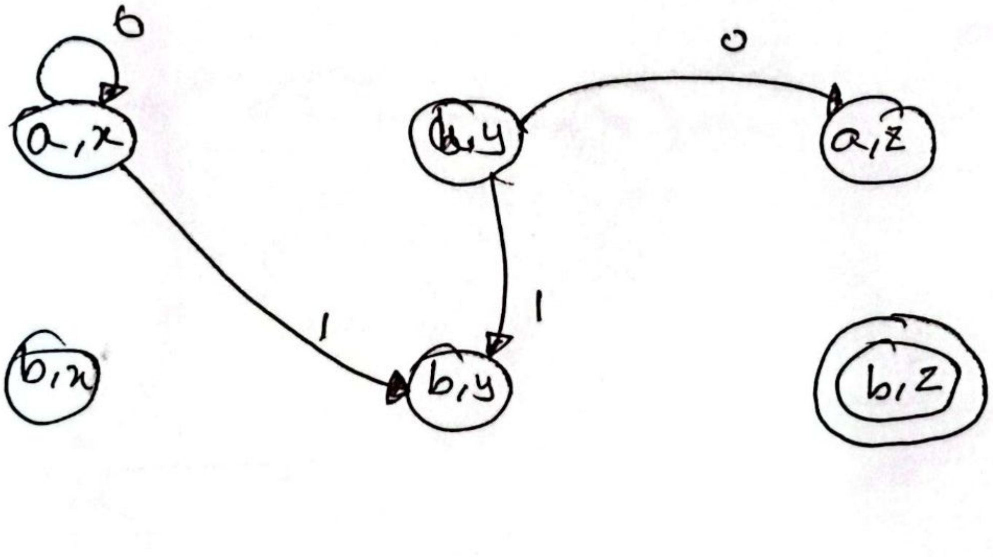
~~Add~~ Odd num. of 1's AND "10" as a substring

M₁ = Odd num of 1's



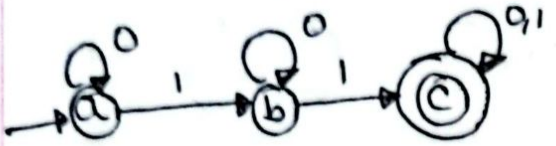
M₂ = 10 as a substring



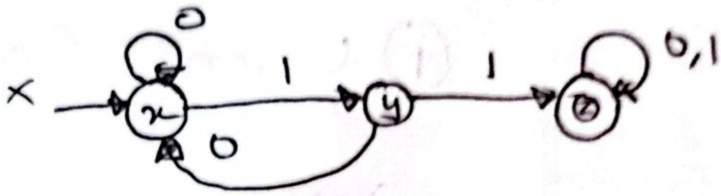


At least 2 1's but no consecutive 1's

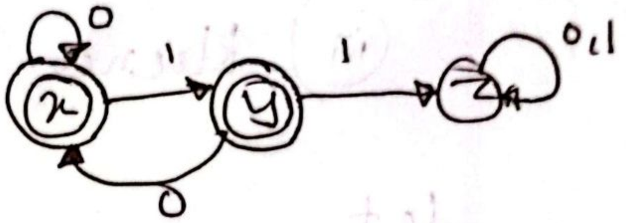
M₁ = At least 2 1's

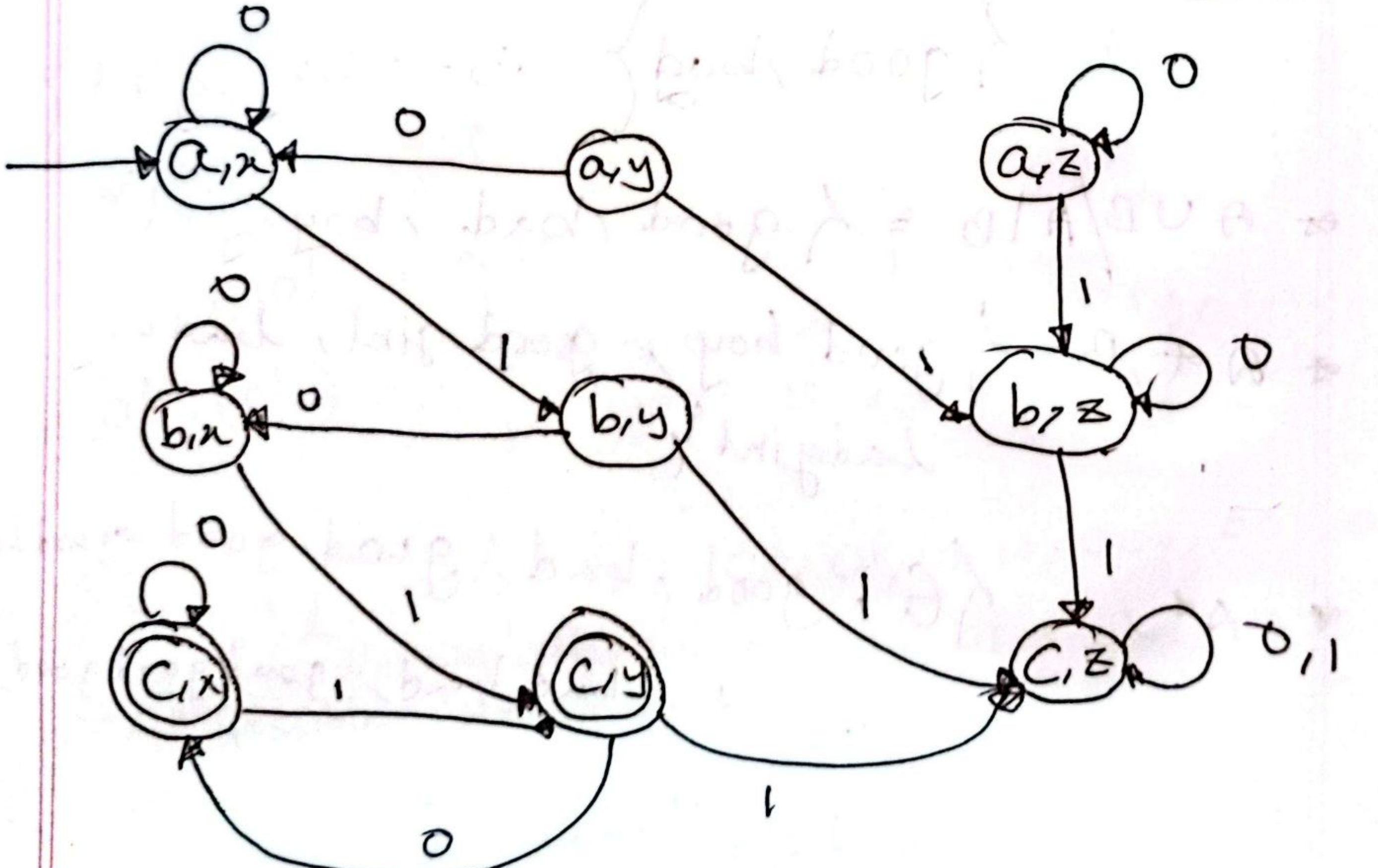


M₂ = Consecutive 1's



Not M₂





0
0
0
a,x
a,y
a,z
1
0
1
1
0
0
b,x
b,y
b,z
0
1
1
1
c,x
c,y
c,z
1
0,1
1
0