Automata Assignment 1

1. Give DFA for the following languages, over the alphabet {0,1}.

a) Set of all strings that are at least of length 4 and contains even number of 1's.

b) Set of all strings with number of 0's is divisible by 5 and number of 1's is divisible by 3.

c) All strings where each 0 is followed by consecutive two 1's.

d) L={w|w has even number of 1's and one or two 0's}

e) L={w|w contains neither the substrings 01 nor 10}

f) Set of all strings that end with 11 and length is divisible by 3.

2. Give NFA/ϵ-NFA for the following languages, over the alphabet {0,1}.

a) All strings containing exactly 4 0s or an even number of 1s.

b) All strings such that the third symbol from the right end is a 0.

c) All strings that contains an even number of 0s or exactly two 1s.

d) The set of strings that start in 1 and end in 01.

e) All strings that end with two consecutive same symbols.

3. Convert to a DFA the following NFA.

	0	1
→p	{p,q}	{p}
q	{r}	{r}
r	{s}	ϕ
*s	{s}	{s}

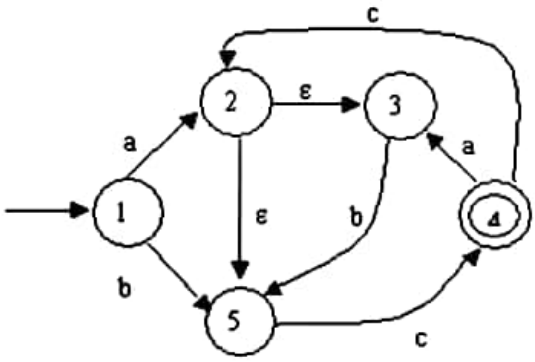
4. Draw a NFA of a set of strings over an alphabet {0, 1,..., 9} such that the final digit has appeared before.

5. Draw a NFA of a set of strings over an alphabet {0, 1,..., 9} such that the final digit has not appeared before.

6. Draw a DFA of a set of string that start with ab and end in bc where alphabet is {a,b,c,d,e}.

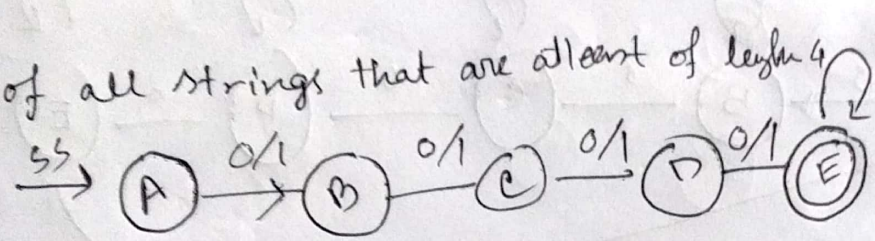
7. Convert to a DFA the following NFA.

7. Convert to a DFA the following NFA.



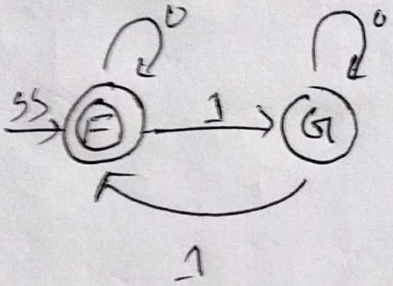
1. (a)

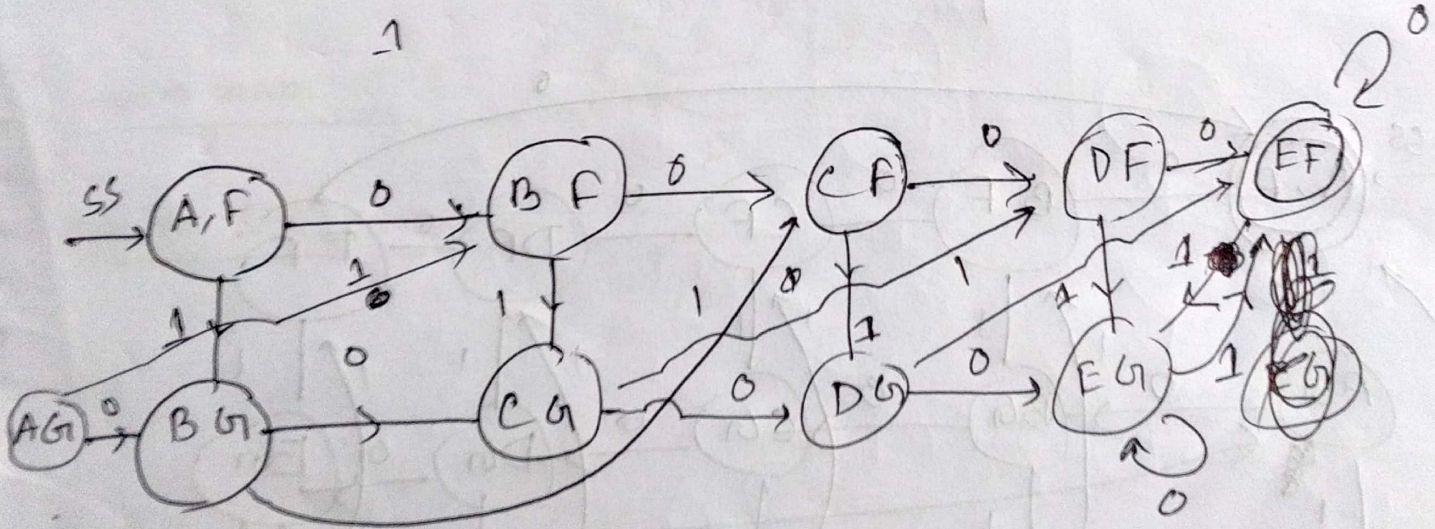
Set of all strings that are atleast of length 4



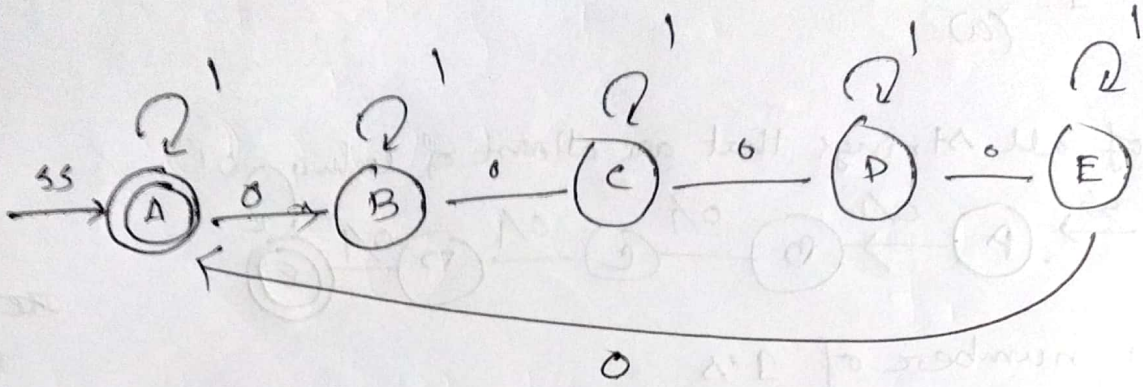
~~re = (0+1)(0+1)(0+1)(0+1)~~
~~(0+1)·(0+1)*~~

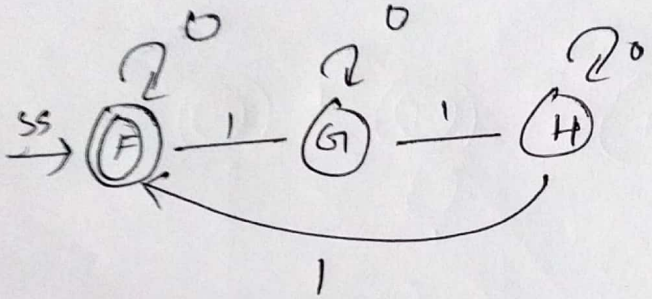
even number of 1's

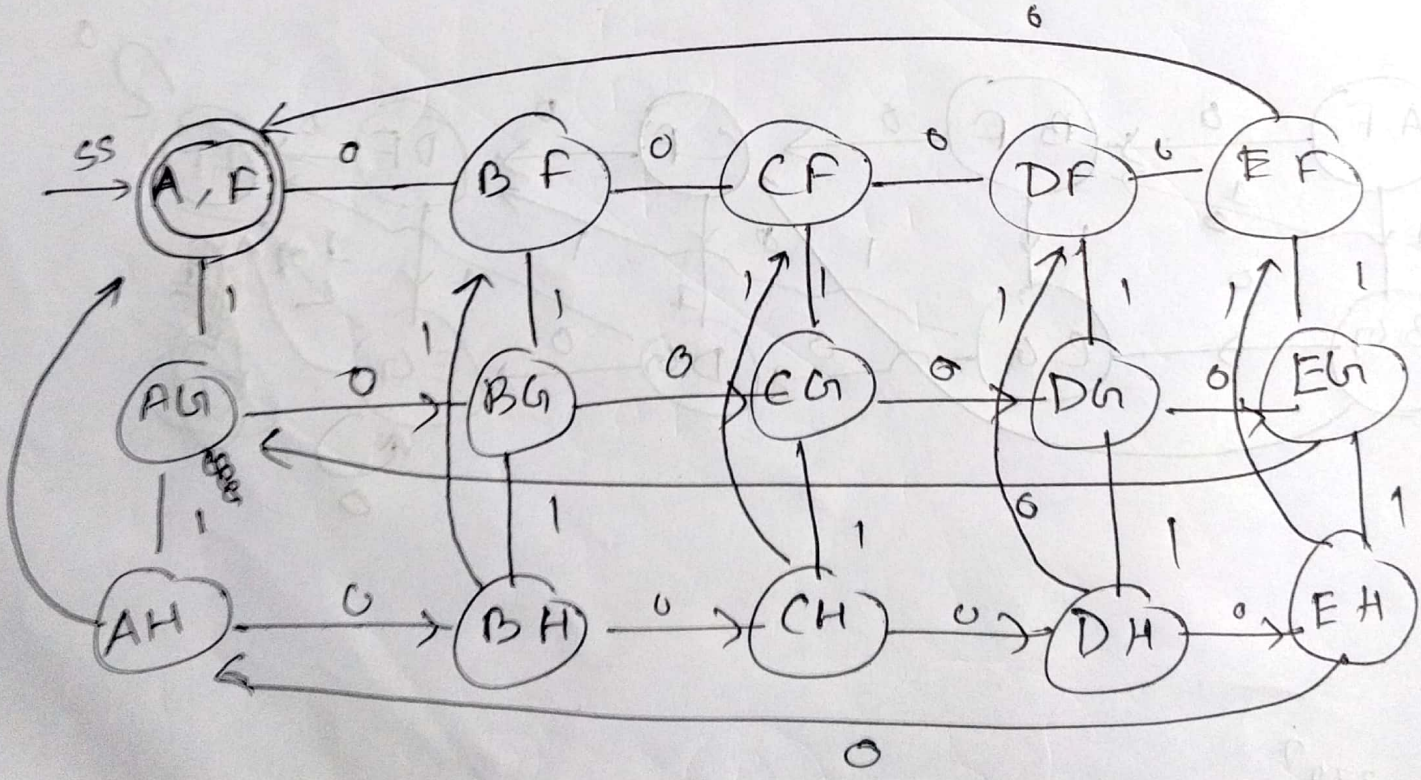


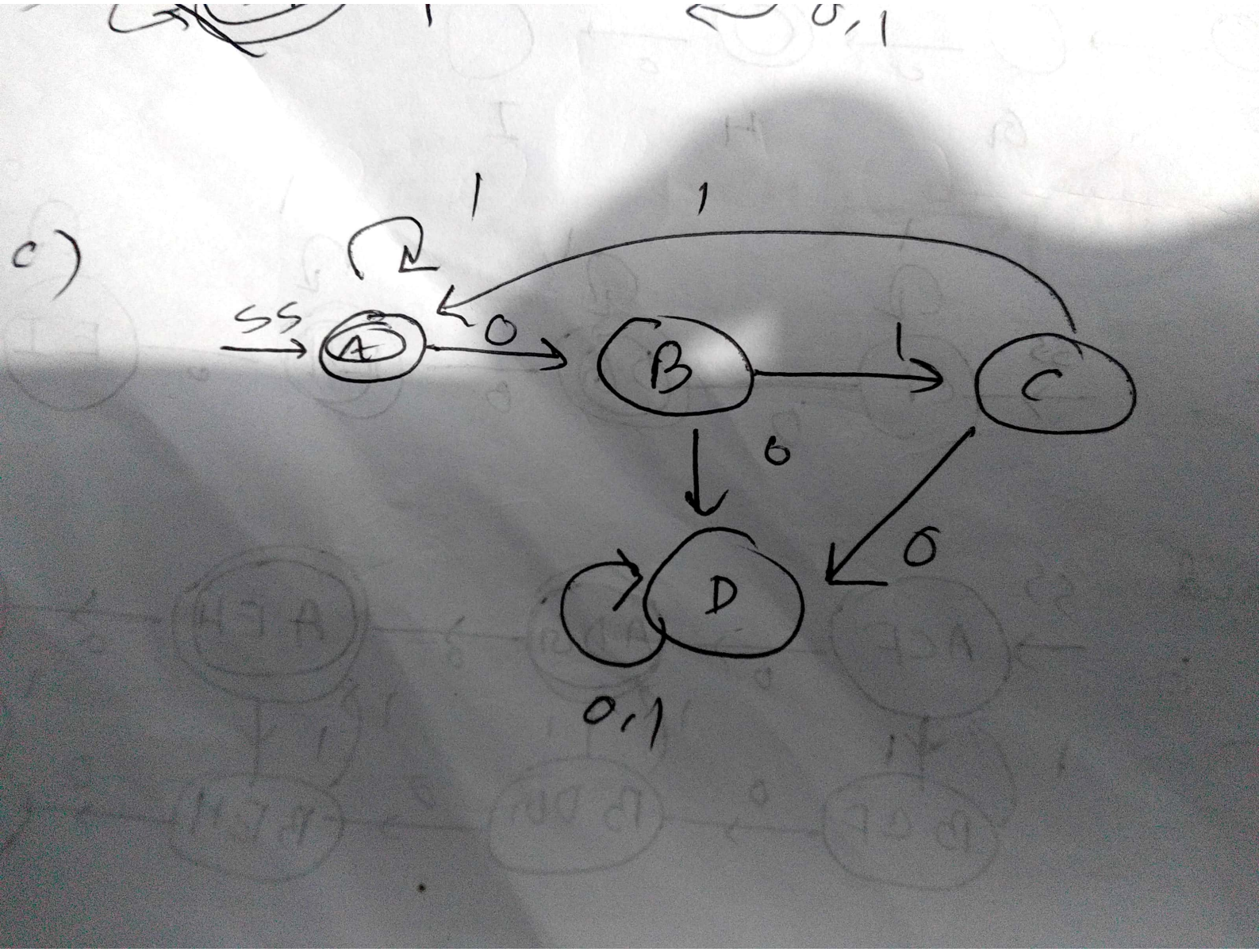


1 b)





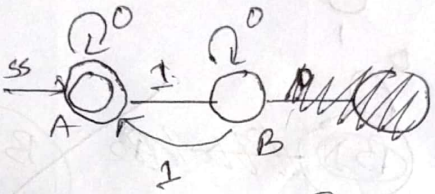




RE Dead End

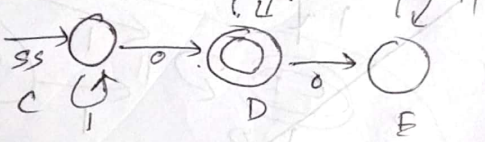
1d) $L = \{ w \mid w$ has even num of 1's and one or two 0's $\}$

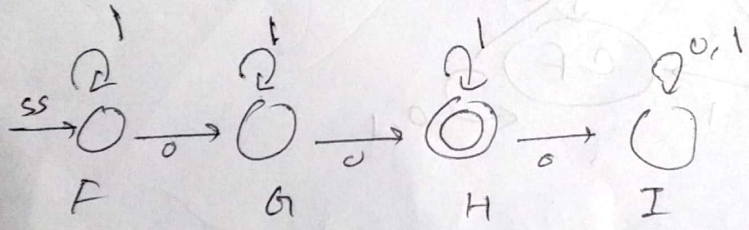
even num of 1:



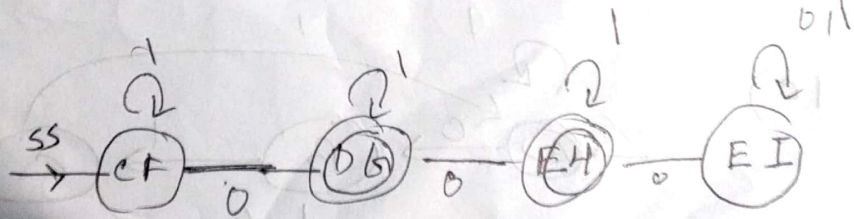
one or 2 0's → one 0:

two 0's

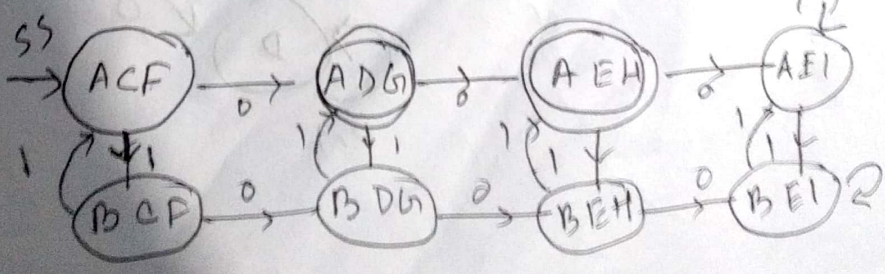




one or 2 0's:

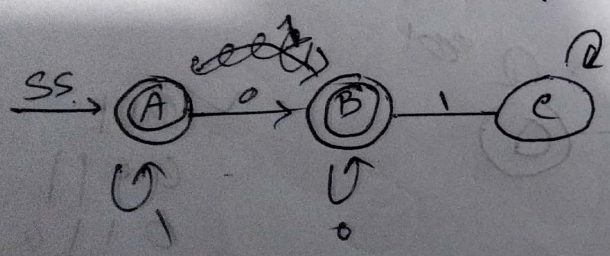


even num of 1 and one or 2 0's :-

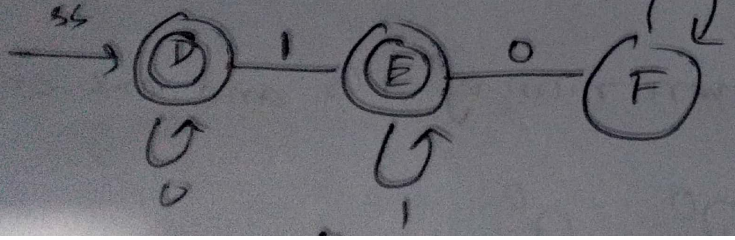


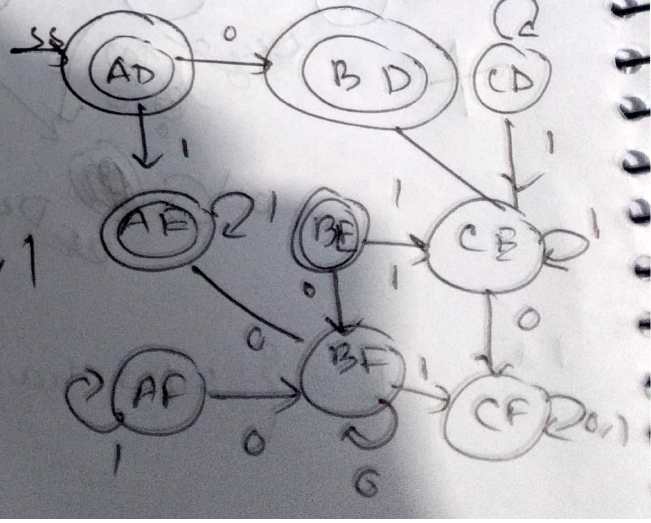
1 e)

Doesn't contain 01



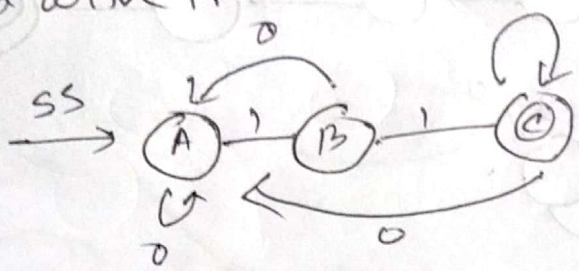
Doesn't contain 10



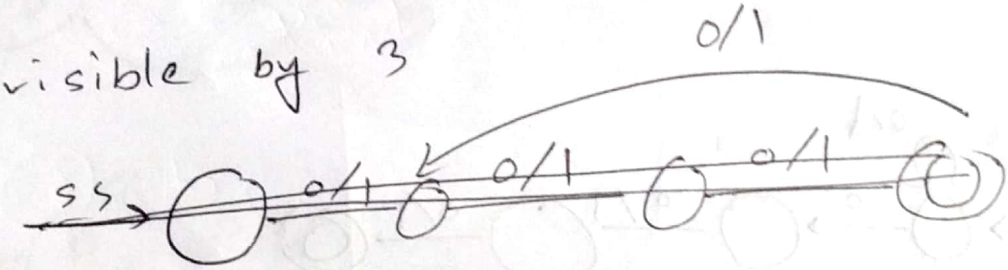


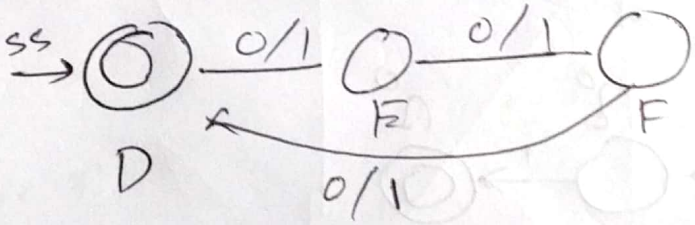
1 f)

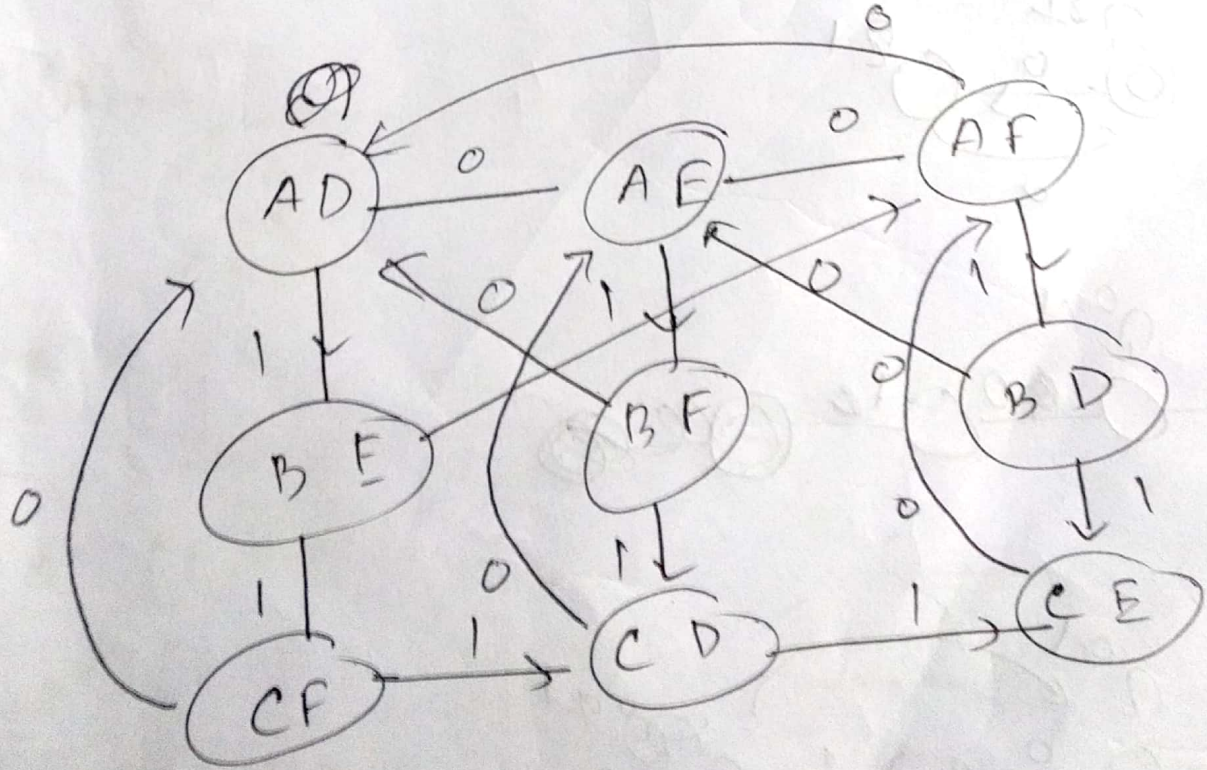
end with 11



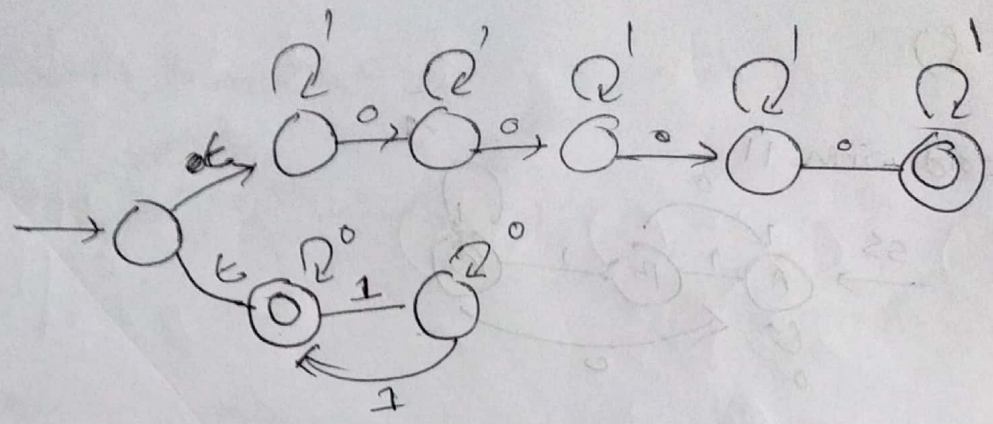
divisible by 3



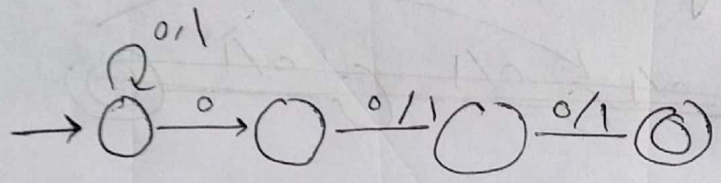




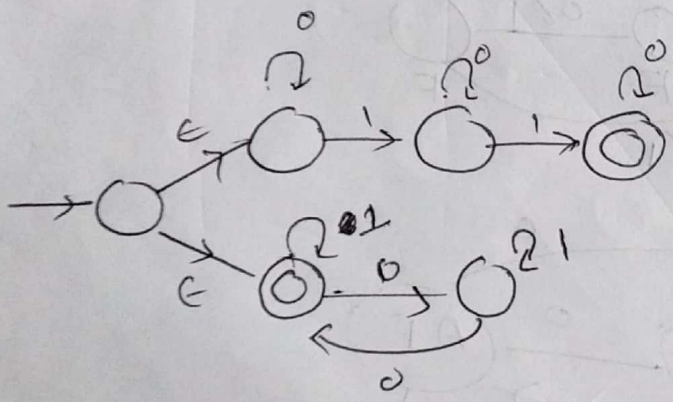
2(a)



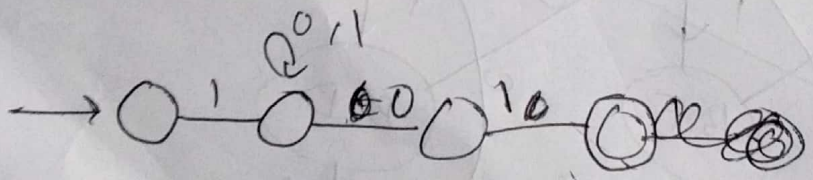
2b)



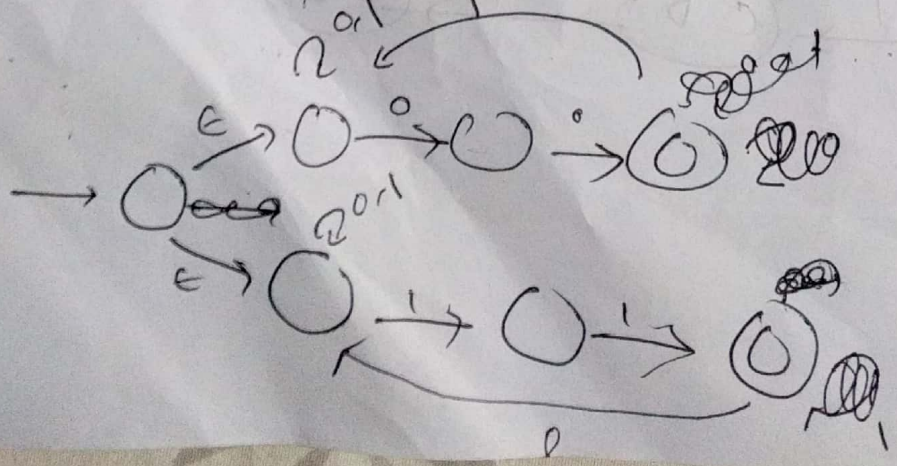
2c)



2d)

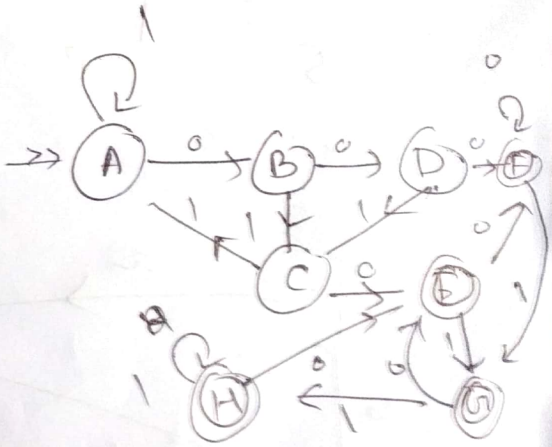


2e)

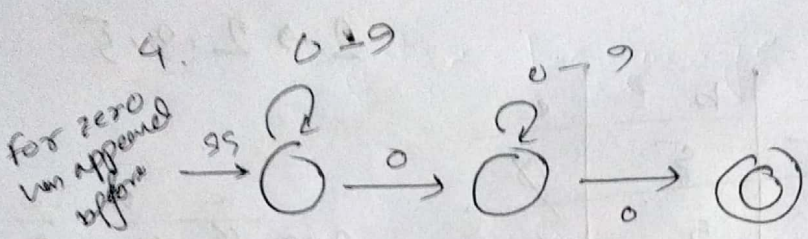


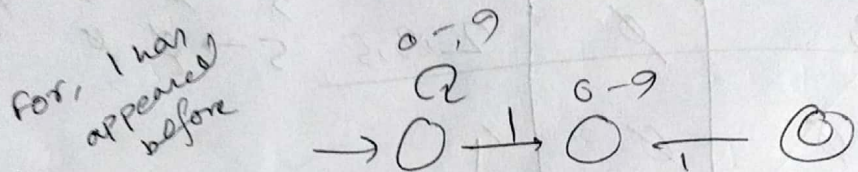
3/ p, q, r, s

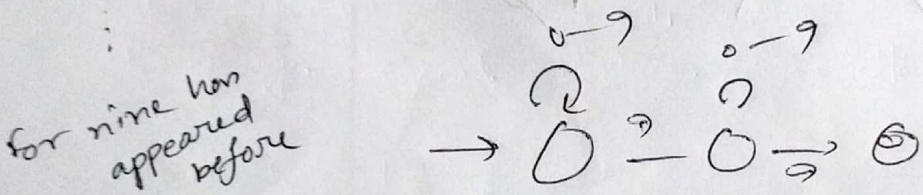
		0	1
(A) →	p	B	A
(B)	pq	D	C
(C)	pr	E	A
(H)	ps	E	H
(D)	pqr	F	C
(E)	pqs	F	G
(F)	pqrs	F	G
(G)	prs	E	H

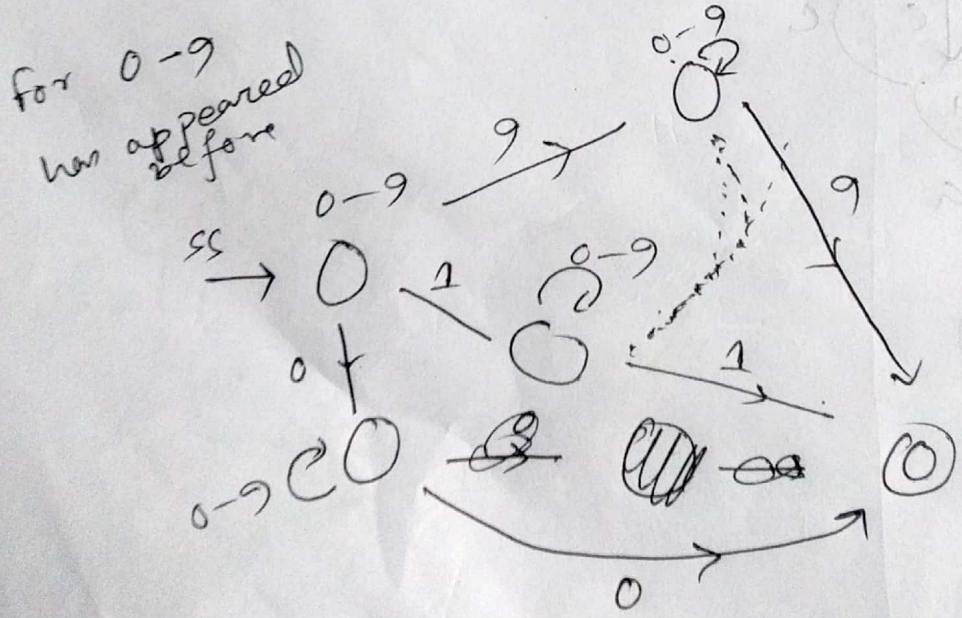


4.





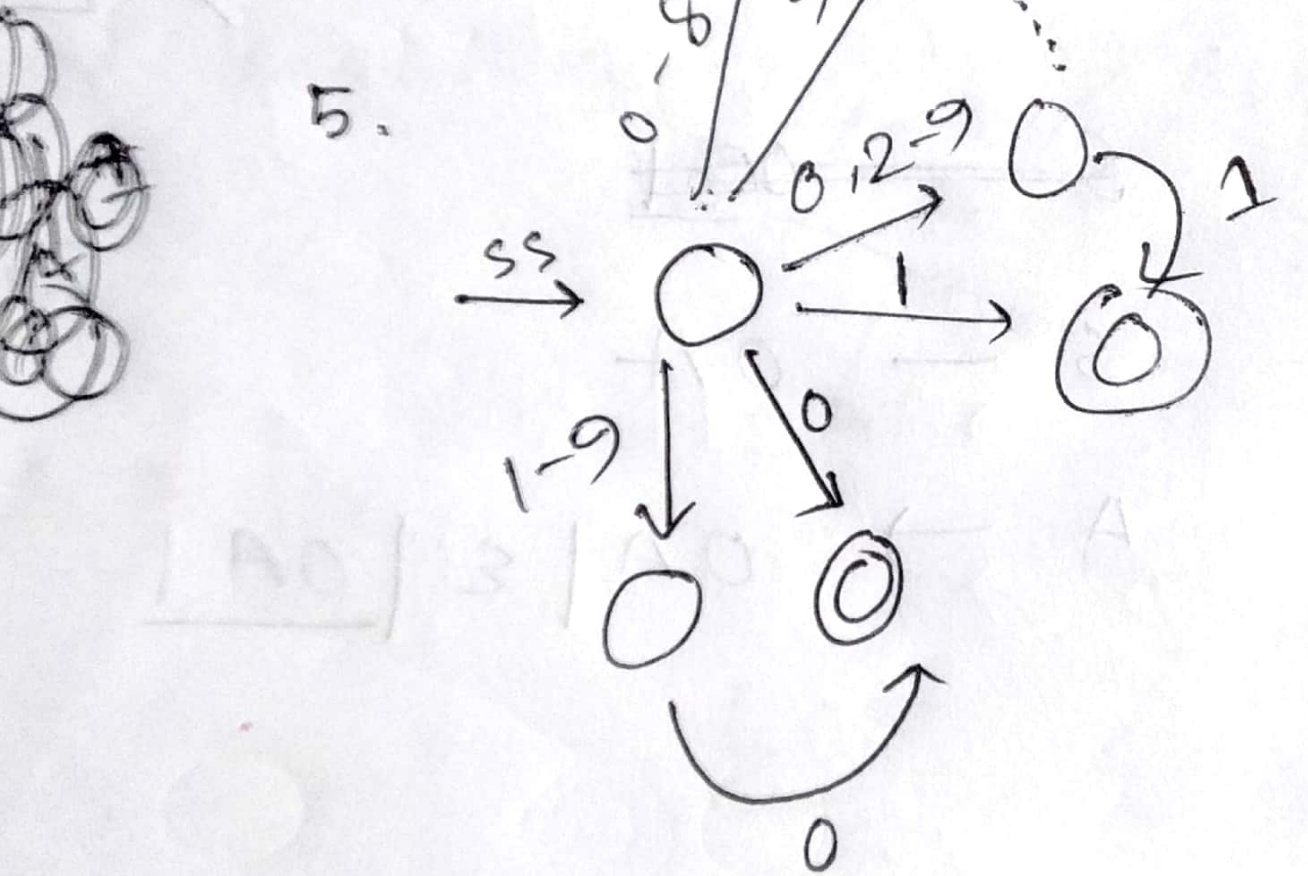




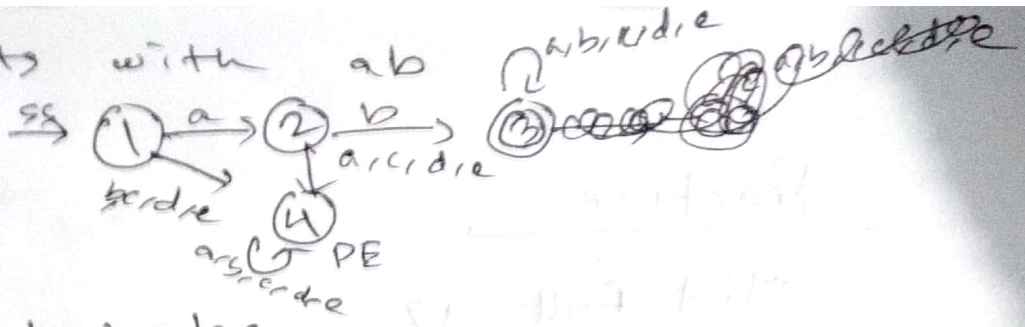
{ assuming there are 2 to 8 such ways. }

Assuming there are such cases for (2-8)

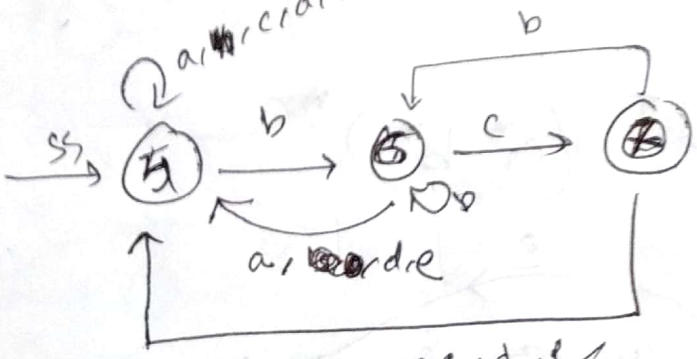
5.



6. starts with ab

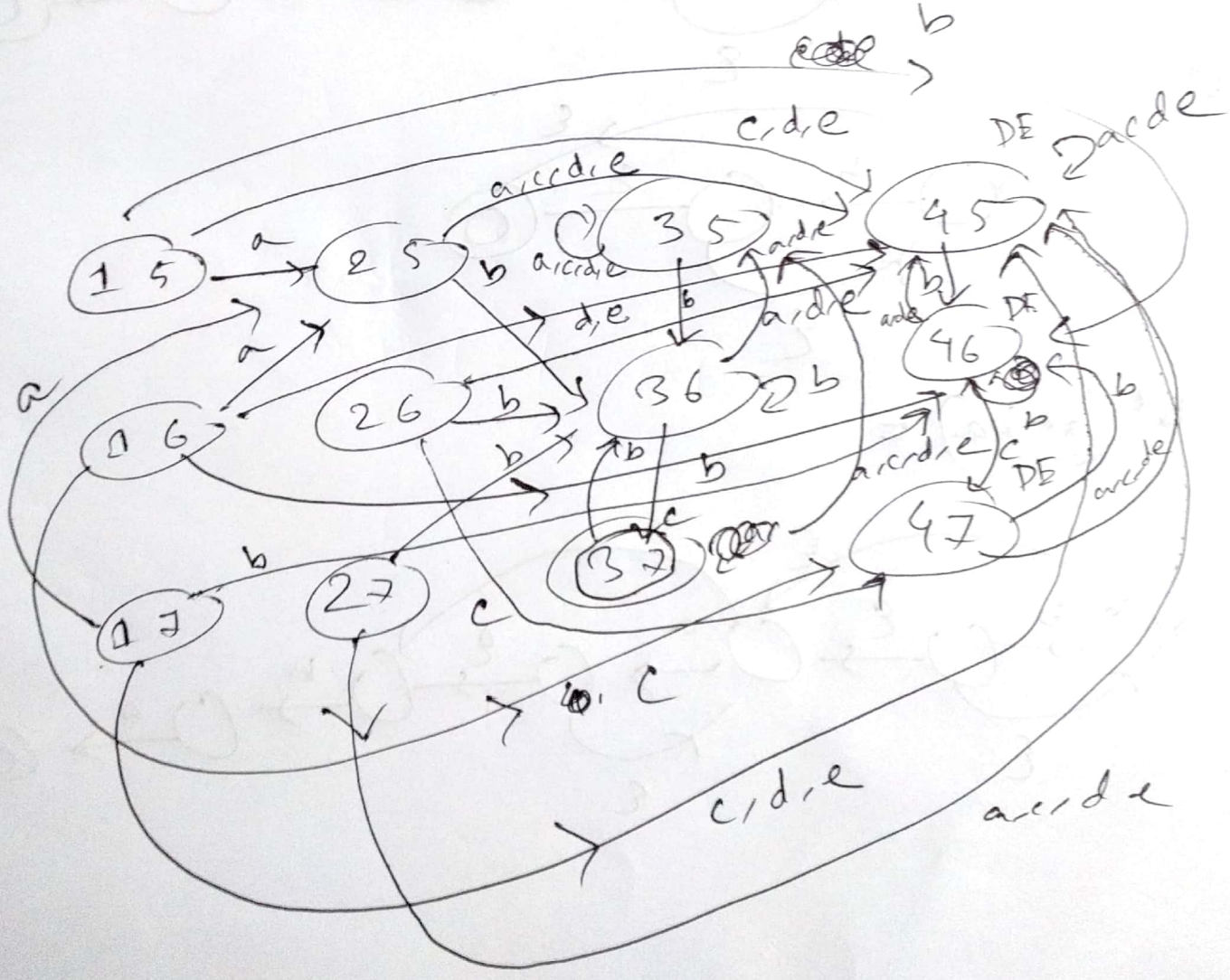


ends in bc



bcc

bbc



7.

$2 \rightarrow 2,3,5$

State	a	b	c
→ 1	2,3,5	5	∅
2,3,5	∅	5	4
* 4	3	∅	2,3,5
5	∅	∅	4
3	∅	5	∅

	a	b	c
$2 \rightarrow$	∅	∅	∅
$3 \rightarrow$	∅	5	∅
$5 \rightarrow$	∅	∅	4