Problems

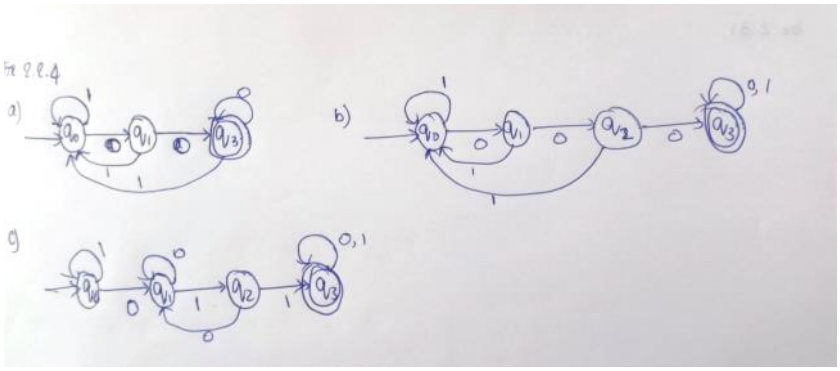
04 November 2024 09:51 PM

Exercise 2.2.4: Give DFA's accepting the following languages over the alphabet {0, 1}:

* a) The set of all strings ending in 00.

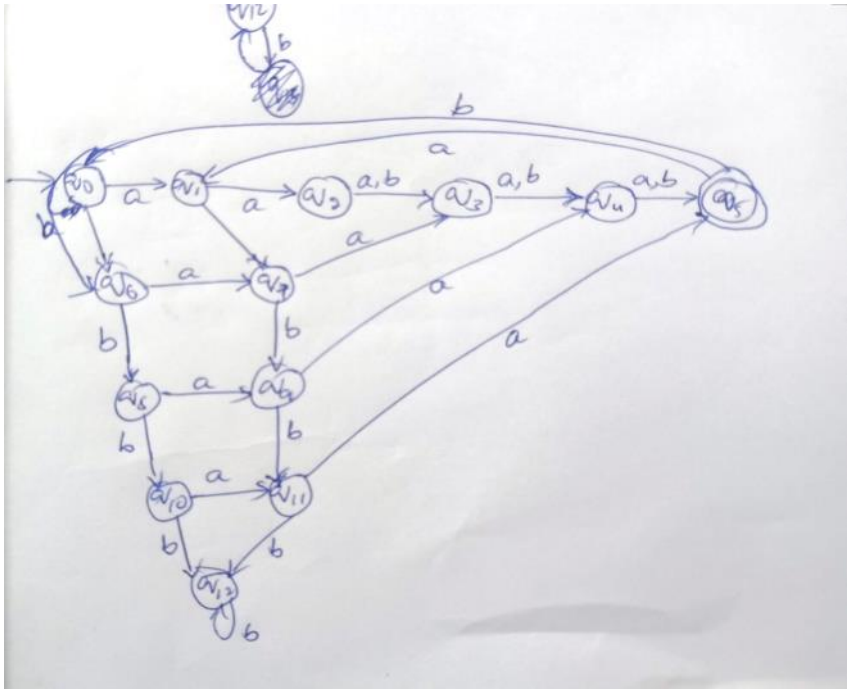
b) The set of all strings with three consecutive 0's (not necessarily at the end).

c) The set of strings with 011 as a substring.



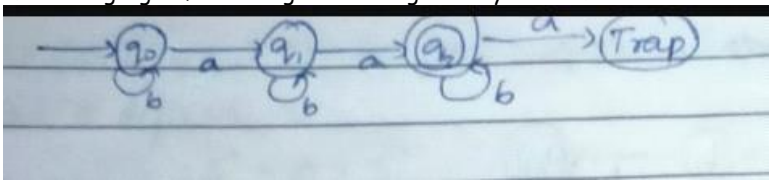
! Exercise 2.2.5: Give DFA's accepting the following languages over the alphabet {0, 1}:

a) The set of all strings such that each block of five consecutive symbols contains at least two 0's.

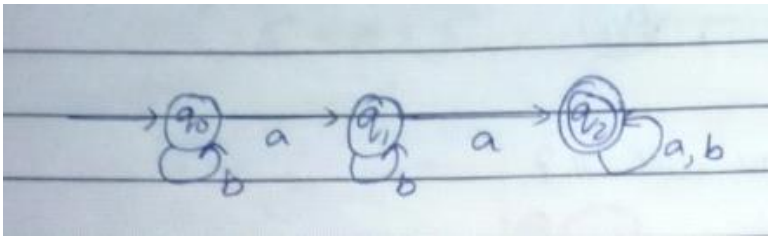


In each part below, draw an FA accepting the indicated language over {a, b}.

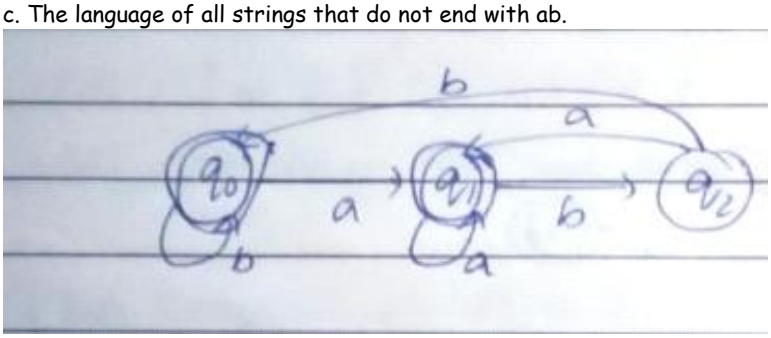
a. The language of all strings containing exactly two a's.



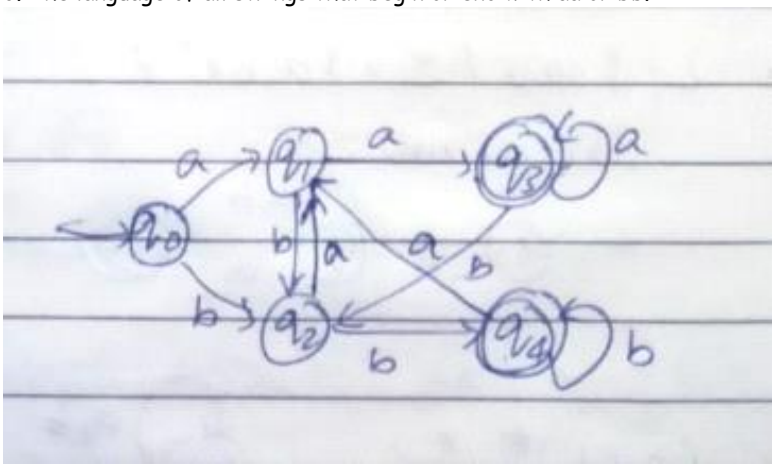
b. The language of all strings containing at least two a's.



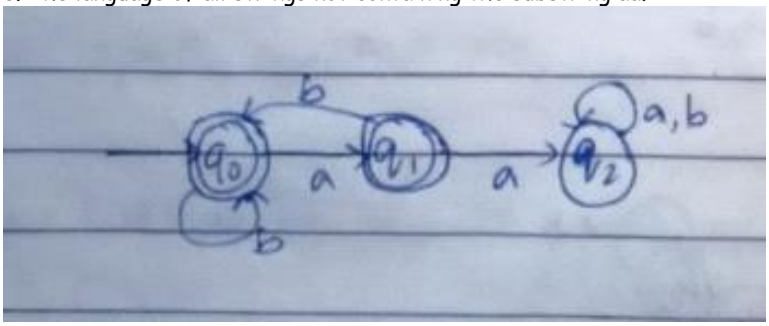
c. The language of all strings that do not end with ab.



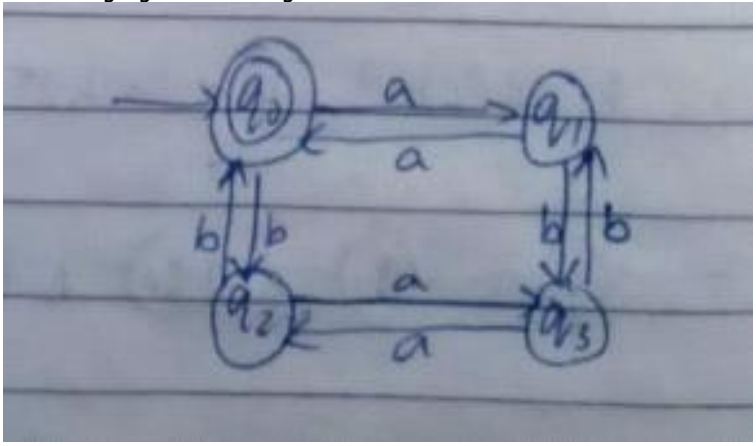
d. The language of all strings that begin or end with aa or bb.



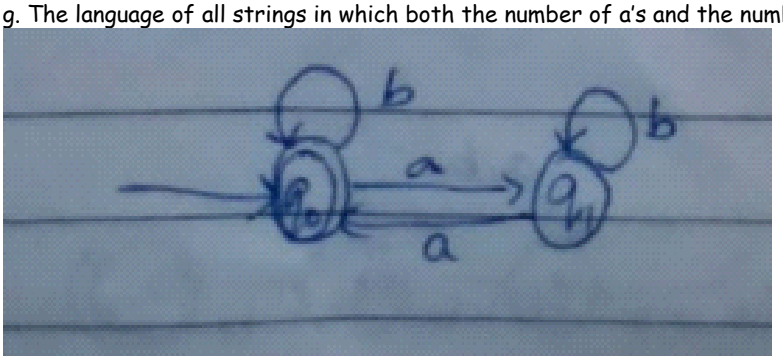
e. The language of all strings not containing the substring aa.



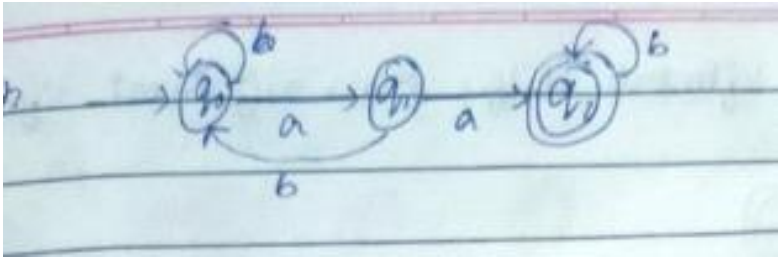
f. The language of all strings in which the number of a's is even.



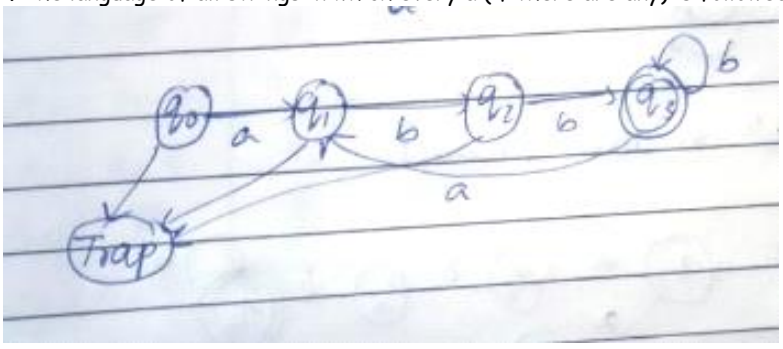
g. The language of all strings in which both the number of a's and the number of b's are even.



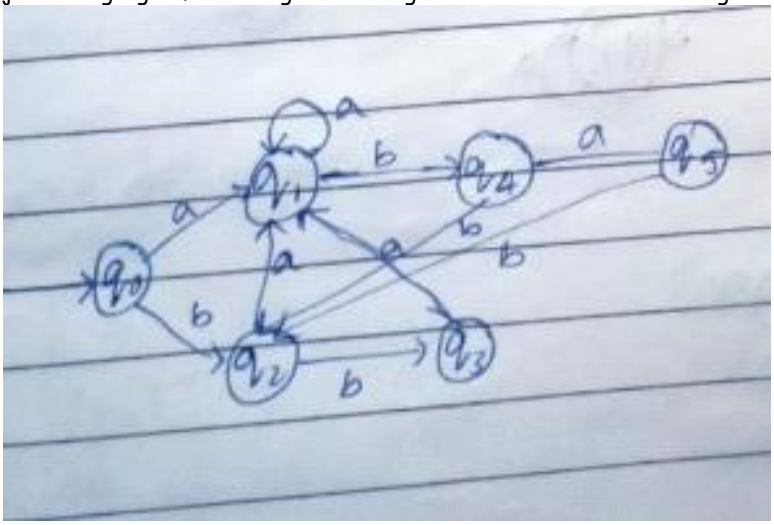
h. The language of all strings containing no more than one occurrence of the string aa. (The string aaa contains two occurrences of aa.)



i. The language of all strings in which every a (if there are any) is followed immediately by bb.



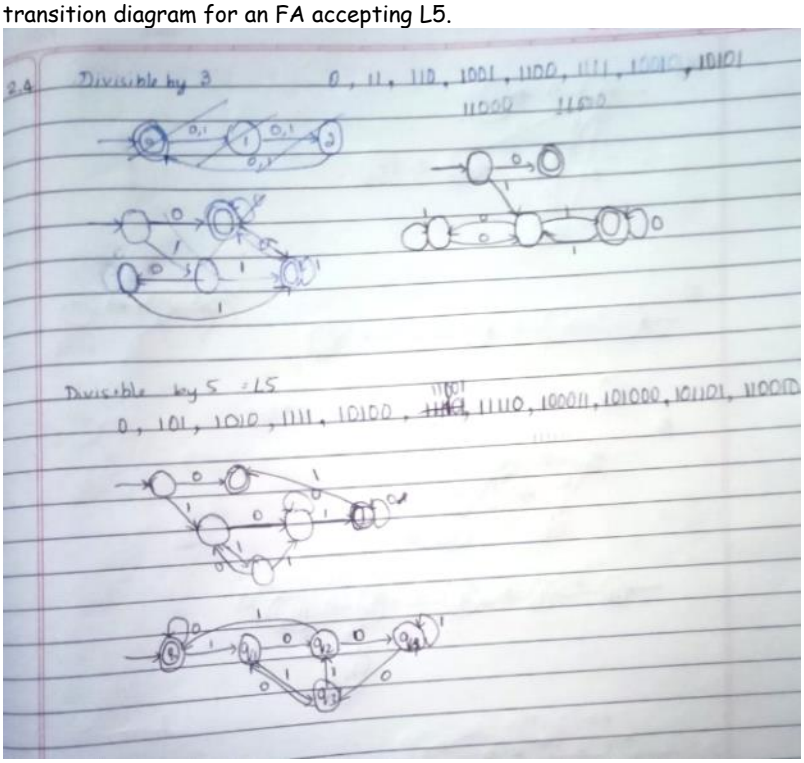
j. The language of all strings containing both bb and aba as substrings.



k. The language of all strings containing both aba and bab as substrings

Example 2.7 describes an FA accepting L3, the set of strings in {0, 1}∗ that are binary representations of integers divisible by 3. Draw a

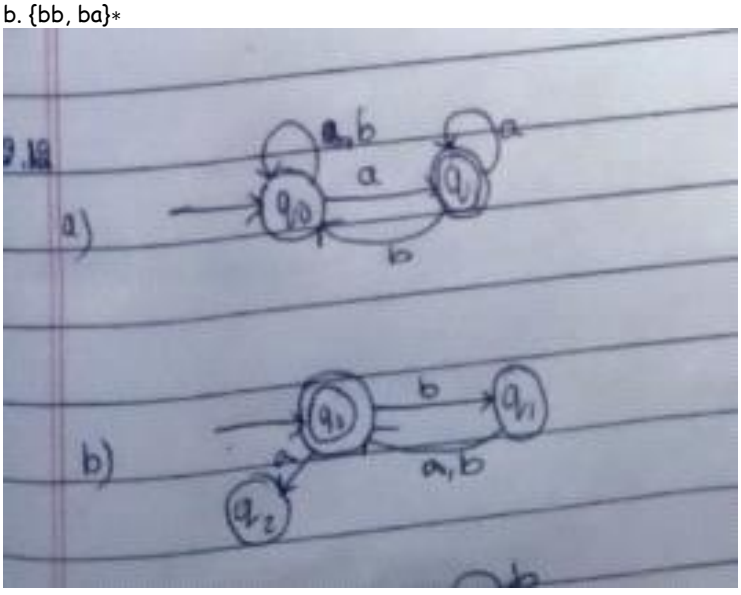
transition diagram for an FA accepting L5.



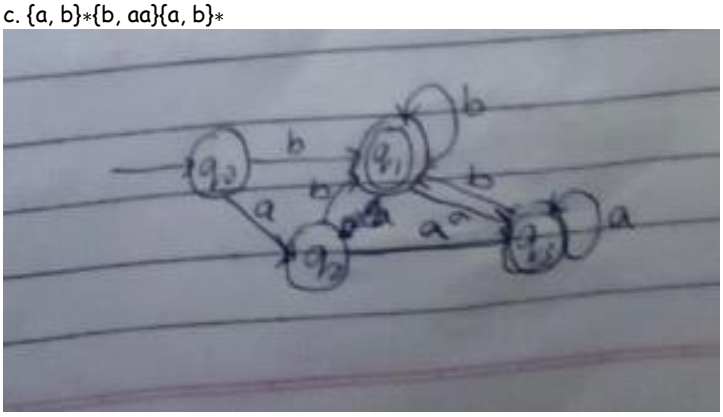
For each of the following languages, draw an FA accepting it.

a. {a, b}∗{a}

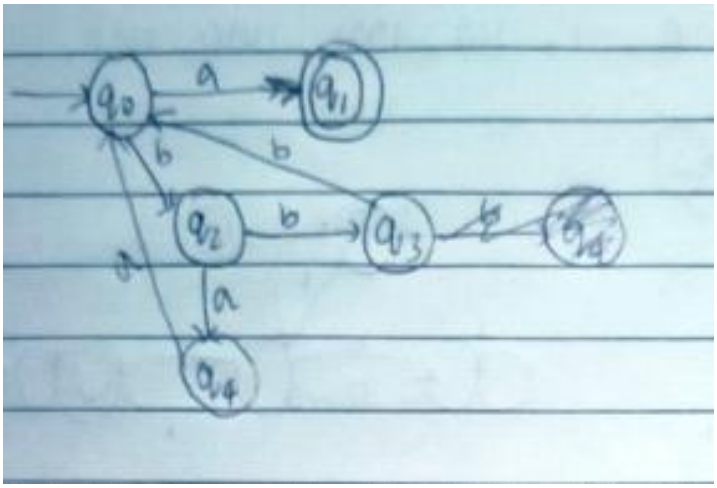
b. {bb, ba}∗



c. {a, b}∗{b, aa}{a, b}∗

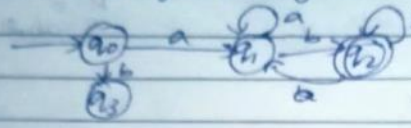


d. {bbb, baa}∗{a}

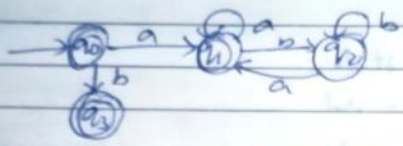

q_0
a
q_1
b
b
q_2
b
q_3
b
q_4
a
q_4

Ex: DFA which accepts $\Sigma = \{a, b\}$ All strings not starting with 'a' & not ending with 'b'

Step 1: Construct for starting with a & ending with b

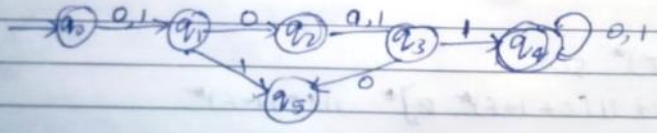


Step 2: Change final state to nonfinal & nonfinal to final

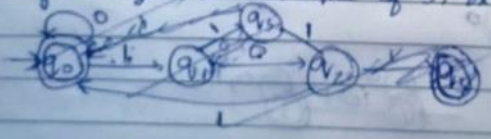


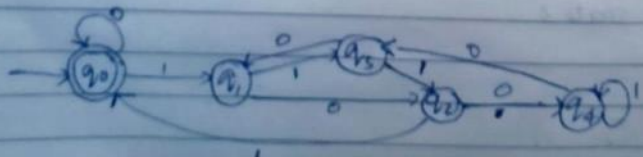
Ex: DFA to accept all strings over (0, 1) in which second symbol is 0 & fourth symbol 1

0/1 0 q1 1 = 4



Ex: ~~Set~~ DFA to accept all strings beginning with 1 that when interpreted as binary integer, is multiple of 5. Ex. 101, 1010, 1111, 10100, ~~10101~~ 11110, 101000, 11001, 11110





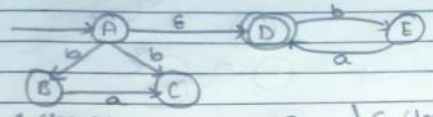
Even though it is multiple of 5, identify the no. of remainders divided by 5. i.e. 0,1,2,3,4

So there will be 5 states

DATE: PAGE:

ε-NFA to NFA

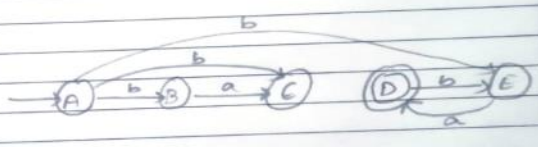
1)



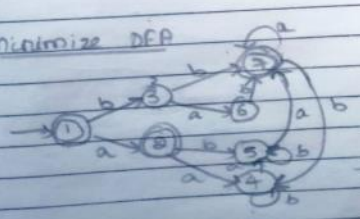
	ε-Closure	a	ε-Closure(a)	b	ε-Closure(b)
A	A, D	∅	∅	B, C, E	B, C, E
B	B	C	C	∅	∅
C	C	∅	∅	∅	∅
D	D	∅	∅	E	E
E	E	D	D	∅	∅

NFA Table

	a	b
→ A	∅	B, C, E
B	C	∅
C	∅	∅
* D	∅	E
E	D	∅



Minimize DFA



2	X				
3	X	X			
4	X	X	X		
5	X	X	X	V	
6	X	X		X	X
7	X	V	X	X	X	X
	1	2	3	4	5	6

1,2(3,6)4,5