

Give DFA's accepting the languages over the alphabet $\{0, 1\}$.

1. the set of all strings with at least one 0 and exactly two 1's.
2. The set of all strings such that each block of three consecutive symbols contains at least two 0's.

Design ε -NFA's for the following languages. Try to use ε -transitions to simplify your design.

3. The set of strings consisting of zero or more a's followed by zero or more b's, followed by zero or more c's.
4. The set of strings that consist of either 01 repeated one or more times or 010 repeated one or more times.

Design regular expression:

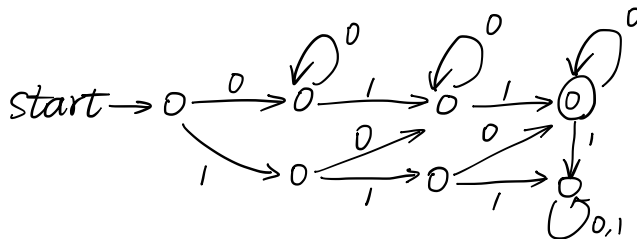
5. The set of all strings of 0's and 1's not containing 101 as a substring.

姓名

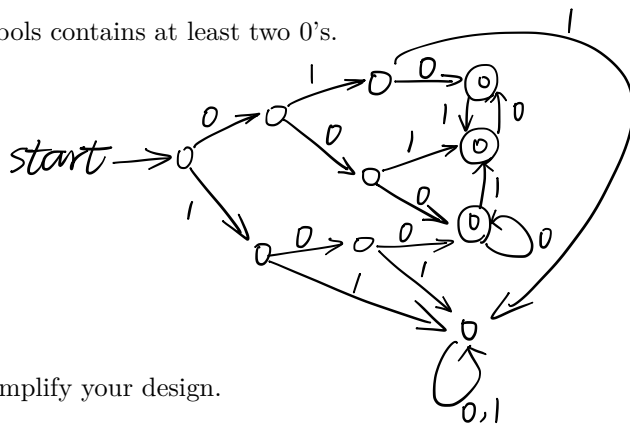
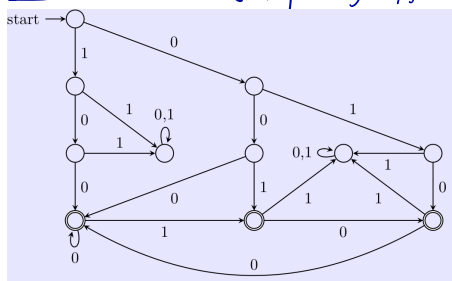
1. the set of all strings with at least one 0 and exactly two 1's.

```

graph LR
    start((start)) -- 0 --> S0(( ))
    start -- 1 --> S1(( ))
    S0 -- 0 --> S0
    S0 -- 1 --> S2(( ))
    S1 -- 0 --> S3(( ))
    S1 -- 1 --> S4(( ))
    S2 -- 0 --> S5(( ))
    S2 -- 1 --> S6((( )))
    S3 -- 0 --> S3
    S3 -- 1 --> S4
    S4 -- 0 --> S4
    S4 -- 1 --> S6
    S5 -- 0 --> S5
    S5 -- 1 --> S6
    S6 -- 0,1 --> S6
  
```



任何3个连续的字符都至少有2个0



3. The set of strings consisting of zero or more a's followed by zero or more b's, followed by zero or more c's.

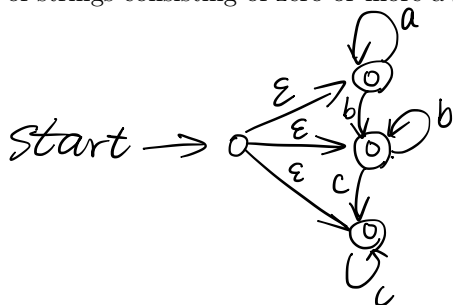


Diagram illustrating a Non-deterministic Finite Automaton (NFA) for the regular expression $(0 \cup 1)^*$. The NFA has four states: a start state (labeled "start"), two intermediate states, and an accepting state (labeled with a double circle). Transitions are labeled with '0' and '1'. The NFA accepts strings consisting of any sequence of 0s and 1s.

```

graph LR
    start((start)) -- 0 --> S1(( ))
    start -- 1 --> S2(( ))
    S1 -- 0 --> S1
    S1 -- 1 --> S2
    S2 -- 0 --> S2
    S2 -- 1 --> S1
    S1 -- 0 --> accept((( )))
    S2 -- 1 --> accept
    style start fill:none,stroke:none
    style accept fill:none,stroke:none
  
```

5. The set of all strings of 0's and 1's not containing 101 as a substring.

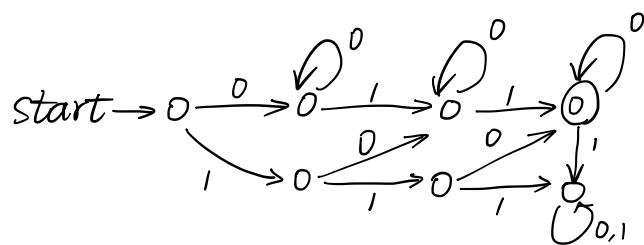
$\varepsilon, 0, 1, 10, 01, 010, 011, 101, 1001, 01$

$$0^* (1^* + 000^*)^* 0^*$$

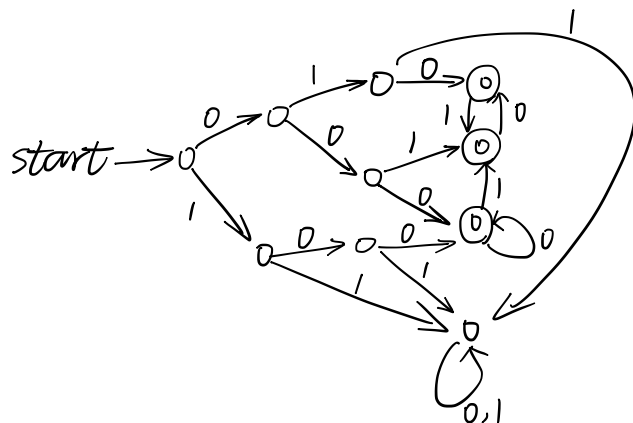
或是

$$1 \quad (0+1)^* (101) + (0+1)^*$$
$$(0+\varepsilon) (1^* + 000^*)^* (0+\varepsilon)$$

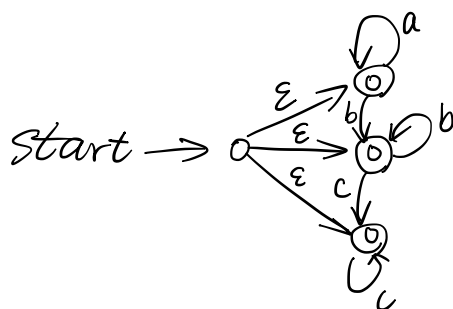
1、



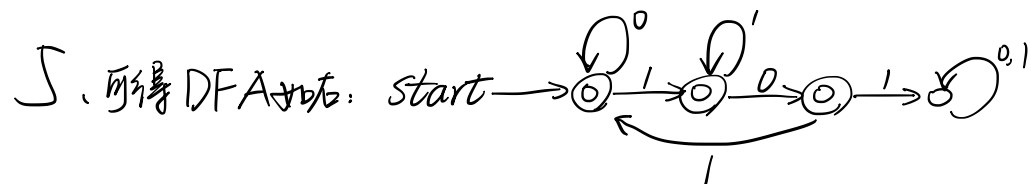
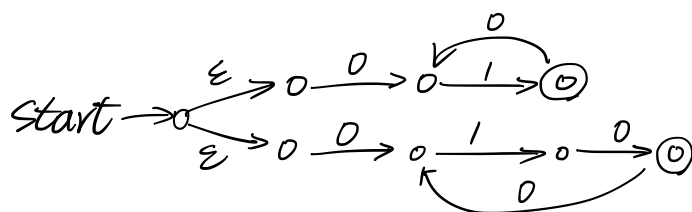
2、



3、



4、



进而有

$$(0^*11^*00)^*(0^* + 0^*11^* + 0^*11^*0)$$

Homework 1

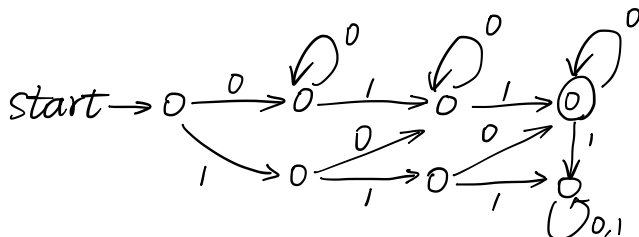
班号

学号

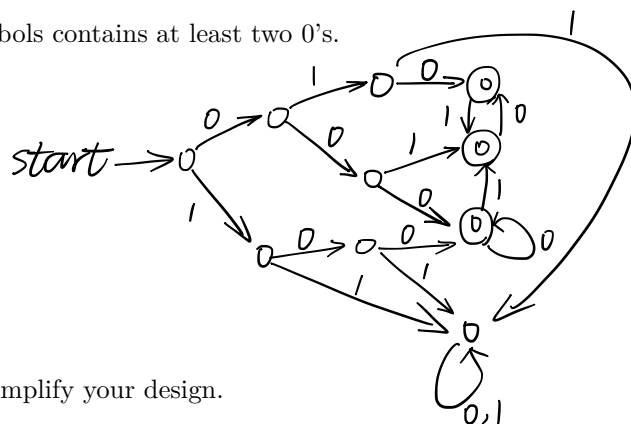
姓名

Give DFA's accepting the languages over the alphabet $\{0, 1\}$.

- the set of all strings with at least one 0 and exactly two 1's.

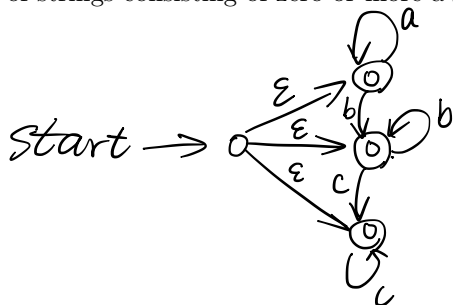


- The set of all strings such that each block of three consecutive symbols contains at least two 0's.

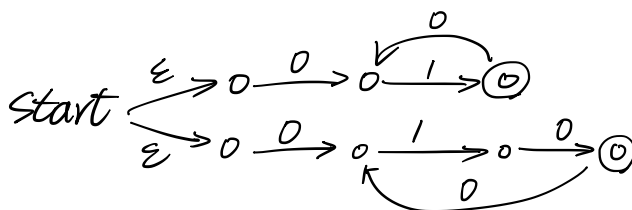


Design ε -NFA's for the following languages. Try to use ε -transitions to simplify your design.

- The set of strings consisting of zero or more a's followed by zero or more b's, followed by zero or more c's.



- The set of strings that consist of either 01 repeated one or more times or 010 repeated one or more times.



Design regular expression:

- The set of all strings of 0's and 1's not containing 101 as a substring.

$\varepsilon, 0, 1, 00, 01, 010, 011, 101, 1001, 10010, 100101$

$$0^*(1^* + 000^*)^*0^*$$

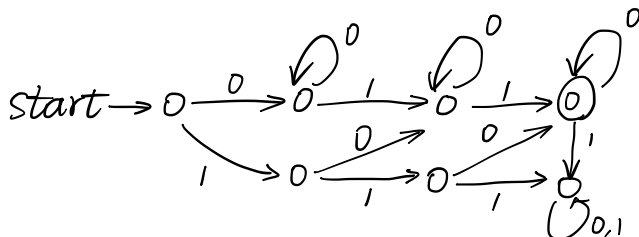
或是

$$(0+1)^*(101)^0 + (0+1)^*$$

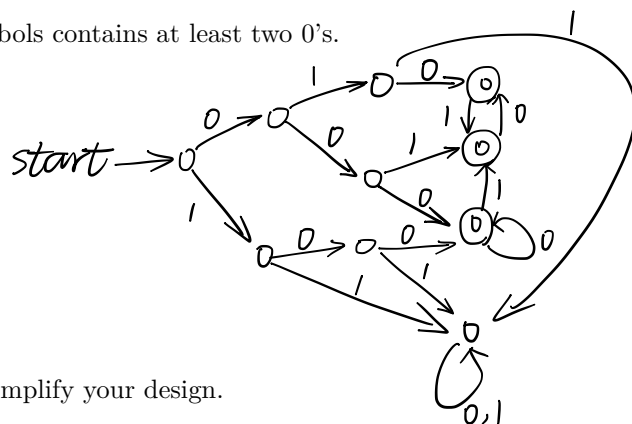
$$(0+\varepsilon)(1^* + 000^*)^*(0+\varepsilon)$$

Give DFA's accepting the languages over the alphabet $\{0, 1\}$.

1. the set of all strings with at least one 0 and exactly two 1's.

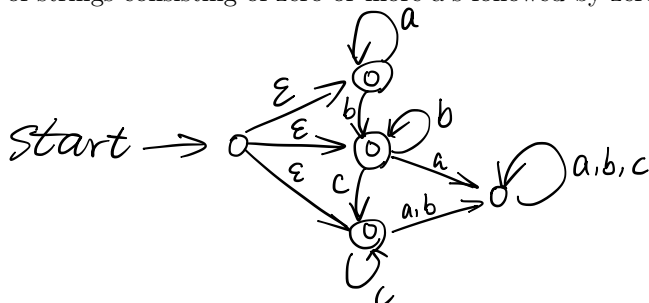


2. The set of all strings such that each block of three consecutive symbols contains at least two 0's.

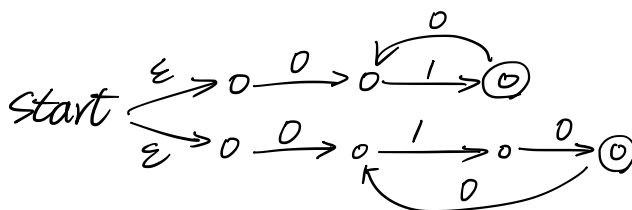


Design ε -NFA's for the following languages. Try to use ε -transitions to simplify your design.

3. The set of strings consisting of zero or more a's followed by zero or more b's, followed by zero or more c's.



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Design regular expression:

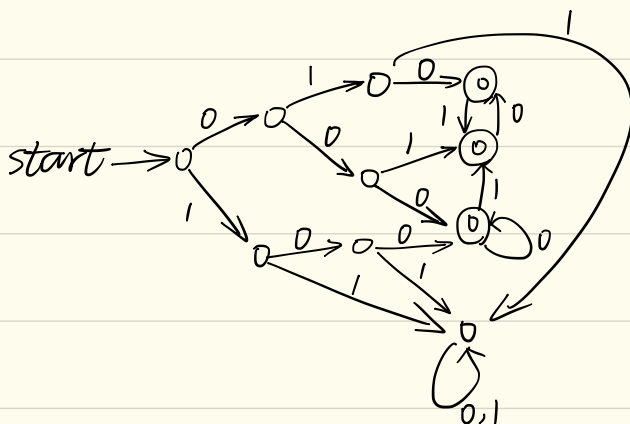
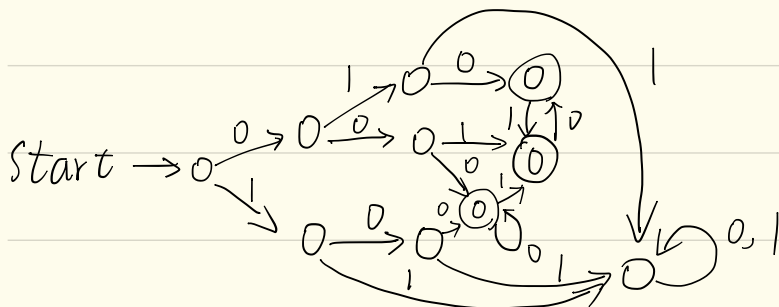
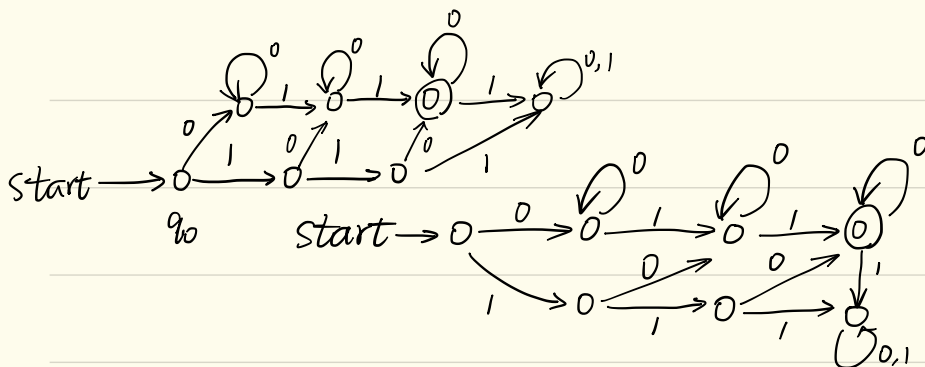
5. The set of all strings of 0's and 1's not containing 101 as a substring.

$\varepsilon, 0, 1, 00, 01, 010, 011, 101, 100101$

$$(0+1)^*(101)^0 + (0+1)^*$$

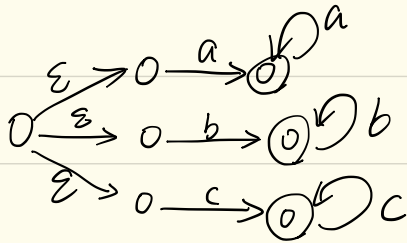
$$0^*(1^*+000^*)^*0^*$$

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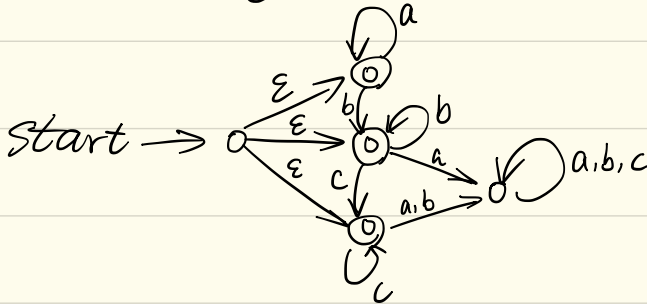
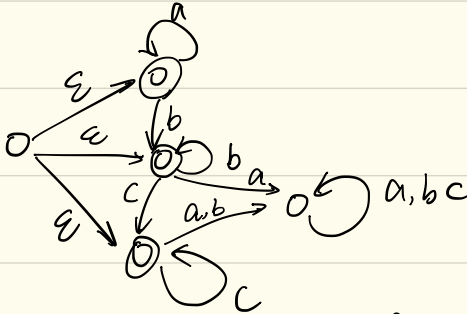


Design ϵ -NFA's for the following languages. Try to use ϵ -transitions to simplify your design.

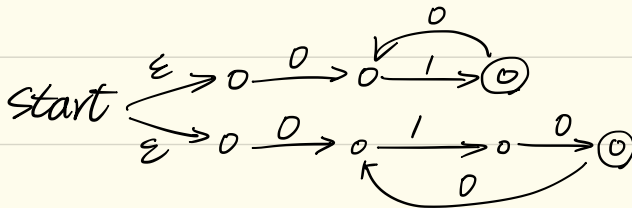
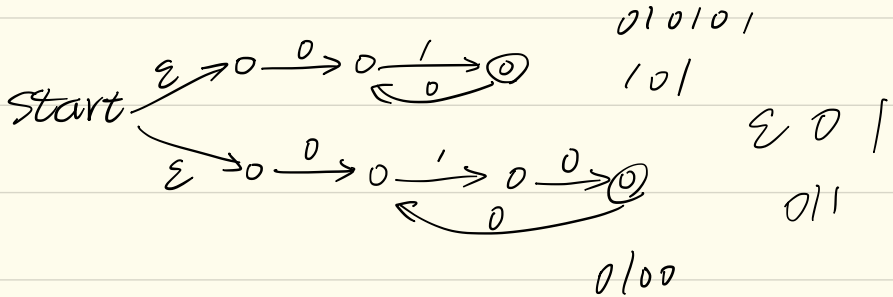
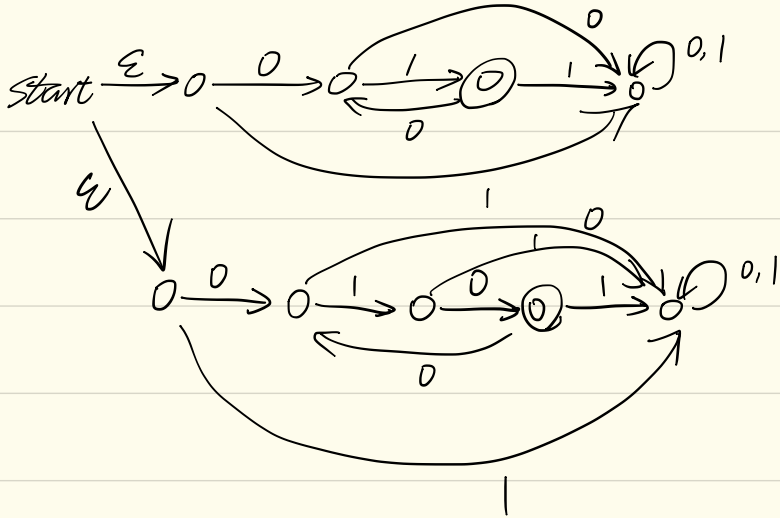
3. The set of strings consisting of zero or more a's followed by zero or more b's, followed by zero or more c's.



a, b, c



4. The set of strings that consist of either 01 repeated one or more times or 010 repeated one or more times



5. The set of all strings of 0's and 1's not containing 101 as a substring.

01, 10, 0, 11

ϵ , 0, 1, 01, 10, 11, 00,

000, 001, 010, 011

100 101 110 111

$(10, 0, 11)^*$ 1, 10, 110, 111, 1010.

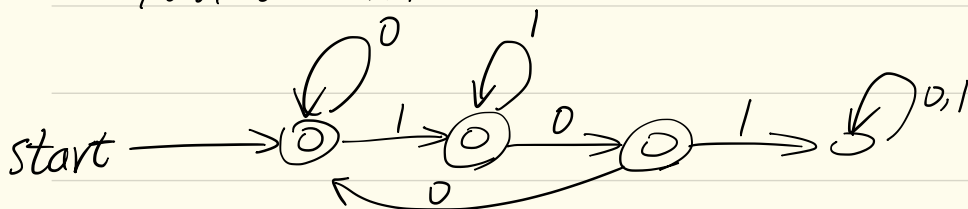
$0(01, 1, 00)^*$ 0, 01,

$11(10, 0, 11)^*$ 11,

$00(01, 1, 00)^*$ 00

1和1之间

1001000100111



$$(0^*11^*00 + \epsilon)^* (0^* + \cancel{0^*1} + 0^*11^* + 0^*11^*0)$$

$$(0^* + 0^*11^* + 0^*11^*0)$$

$$0^*(\epsilon + 11^* + 11^*0)$$

$$0^*(\epsilon + 11^*(\epsilon + 0))$$

$$(0^*11^*00 + \epsilon)^* (0^* + 0^*11^* + 0^*11^*0)$$

$$(0^*11^*00)^* (0^* + 0^*11^* + 0^*11^*0)$$

Homework 1

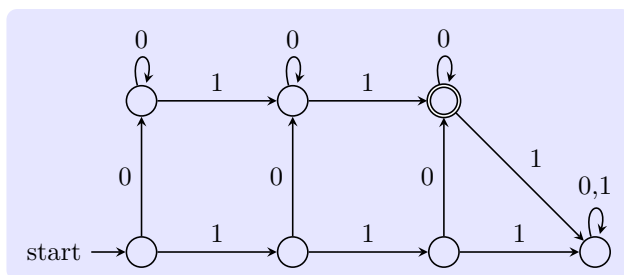
班号

学号

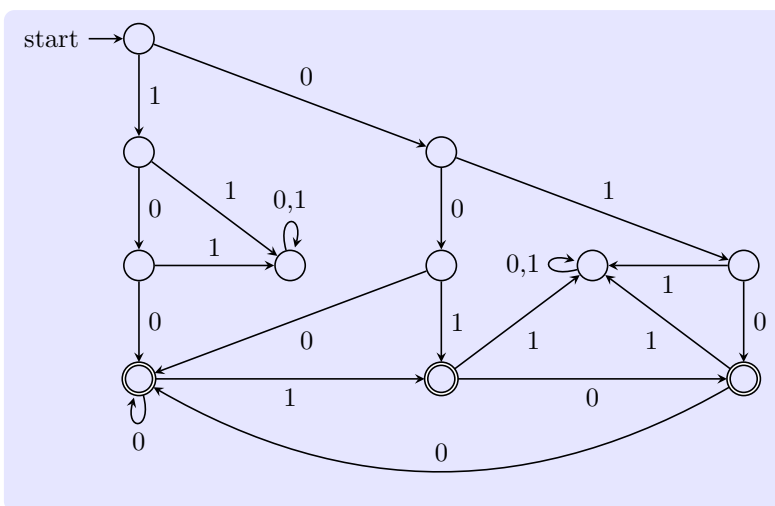
姓名

Give DFA's accepting the languages over the alphabet $\{0, 1\}$.

1. the set of all strings with at least one 0 and exactly two 1's. (所有以 01 开始或结尾的串.)

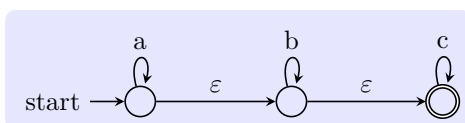
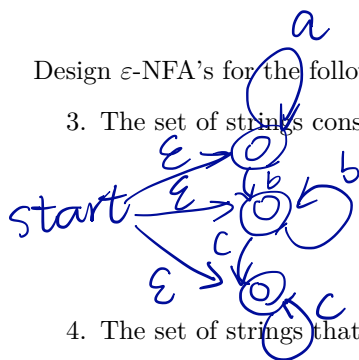


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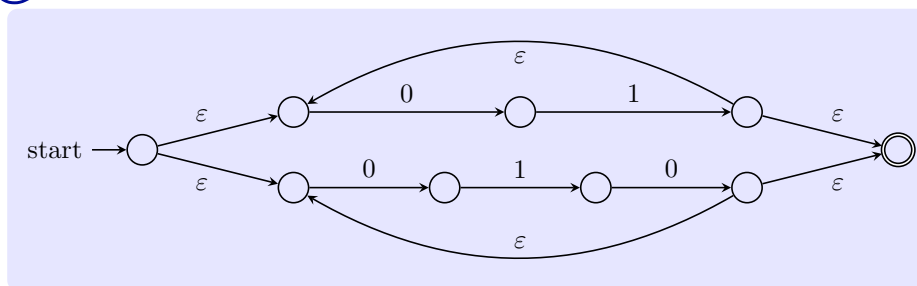


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Design regular expression:

5. The set of all strings of 0's and 1's not containing 101 as a substring.

$0^*(1 + 000^*)^*0^*$

or

$(0 + \epsilon)(1 + 000^*)^*(0 + \epsilon)$