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.

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 l's not containing 101 as a substring.

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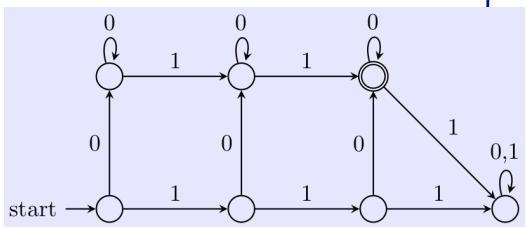
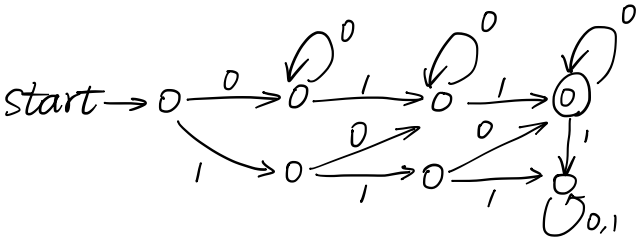
1. the set of all strings with at least one 0 and exactly two 1's.

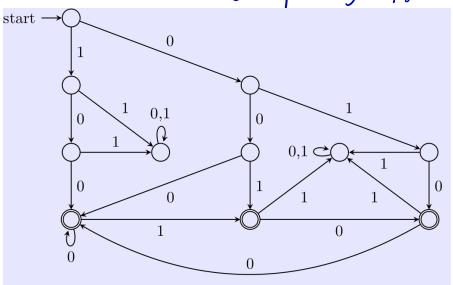
至少1个0和只有2个1串

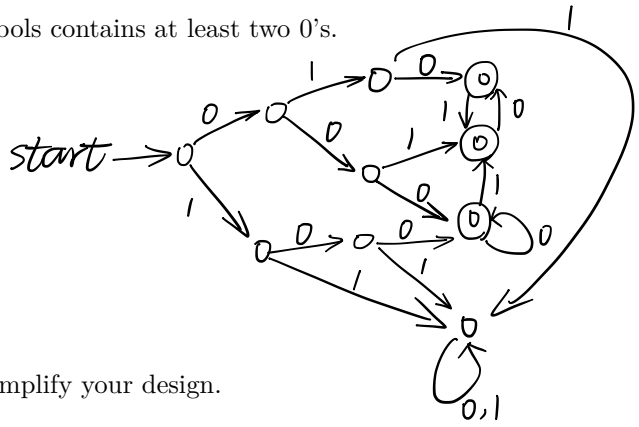




2. The set of all strings such that each block of three consecutive symbols contains at least two 0's.

任何3个连续的字符都至少有2个0





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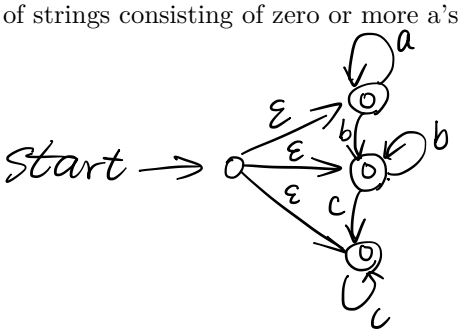

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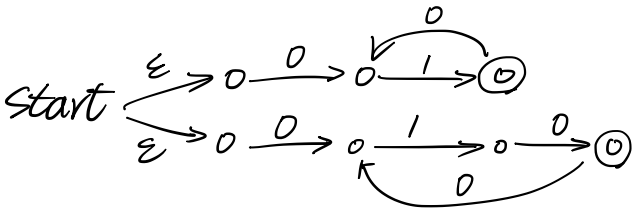


Design regular expression:

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

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

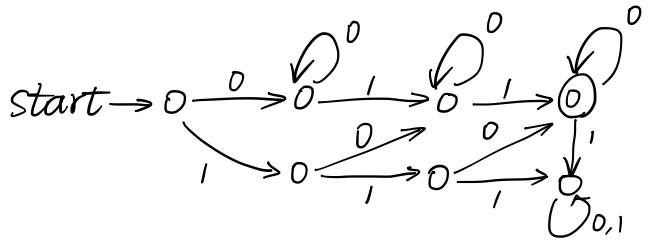
ε 0 1 10 01 010 011 101 1001

或是

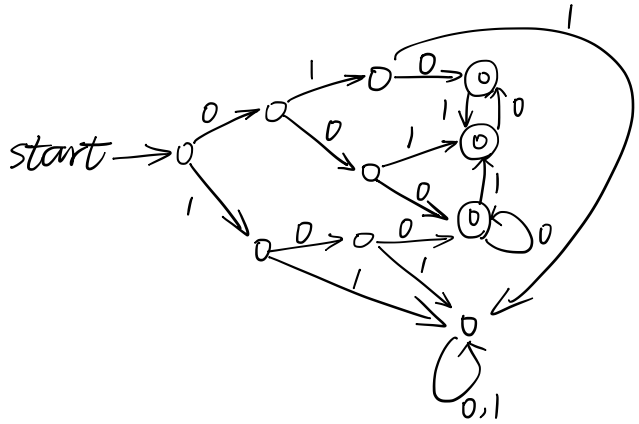
1 $(0+1)^*(101)+(0+1)^*$

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

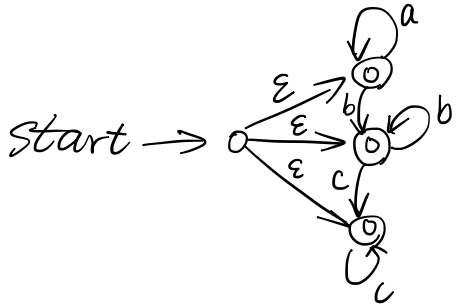
1、



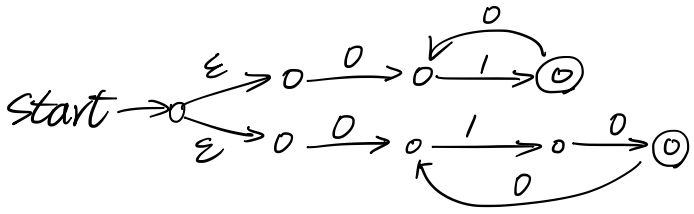
2、



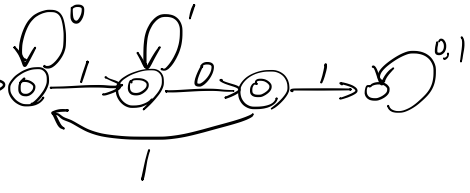
3、



4、



5、可得DFA如右：



进而有

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

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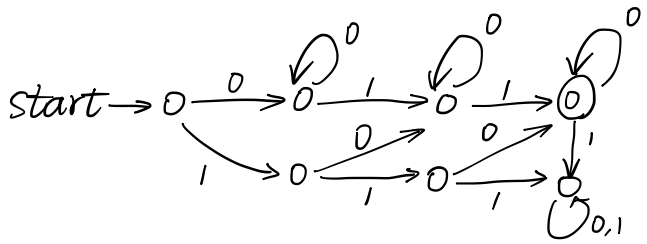

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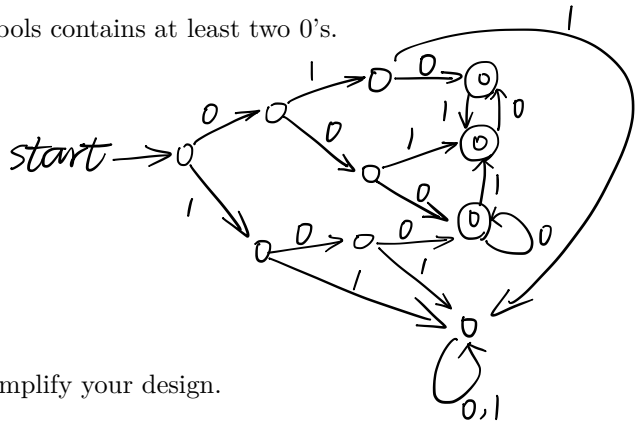
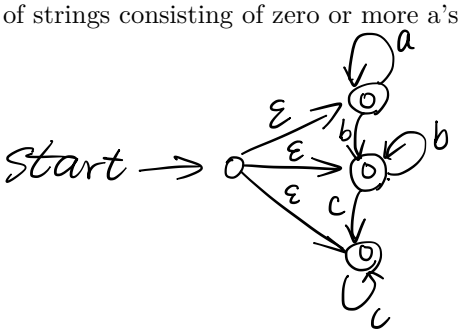


Design ε-NFA's for the following languages. Try to use ε-transitions to simplify your design.

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.



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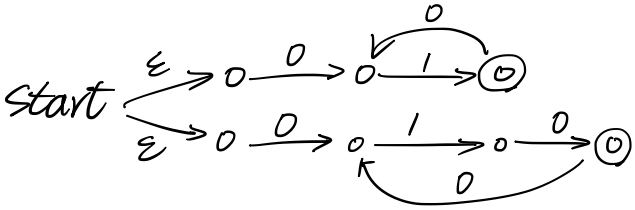

Design regular expression:

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

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

ε 0 1 10 01 010 011 101 1001 或是

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

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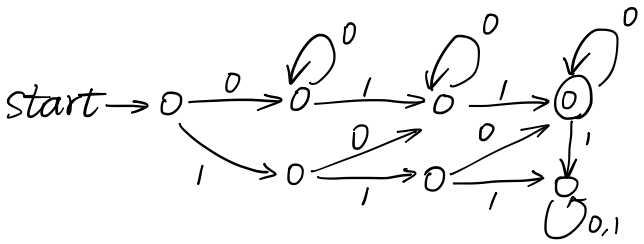

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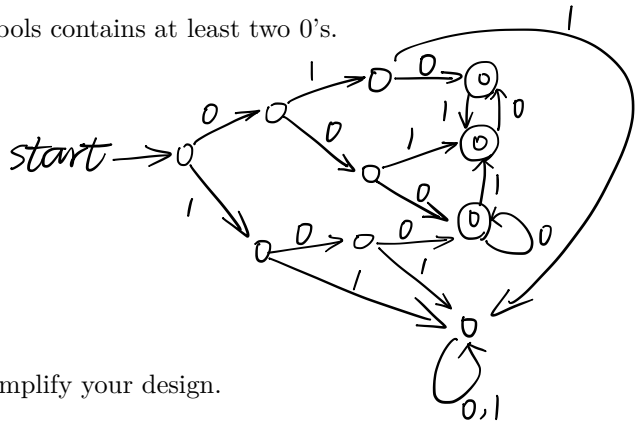

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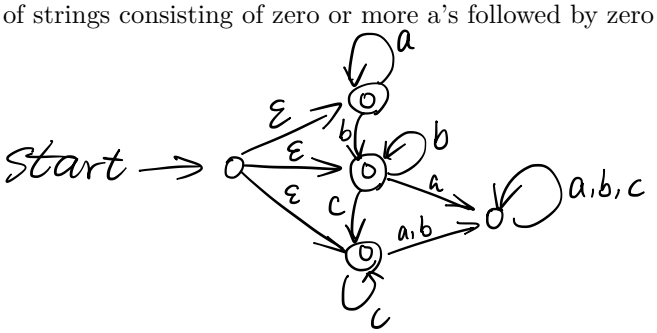

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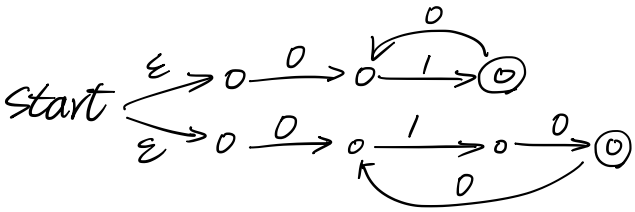


Design regular expression:

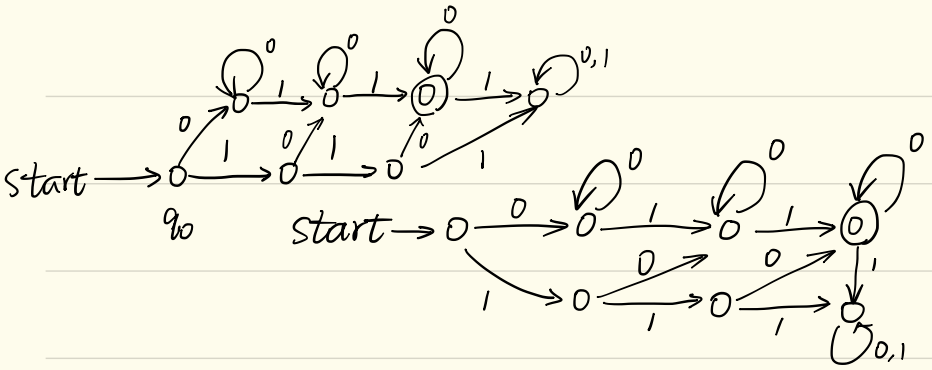
5. The set of all strings of 0's and l's not containing 101 as a substring.

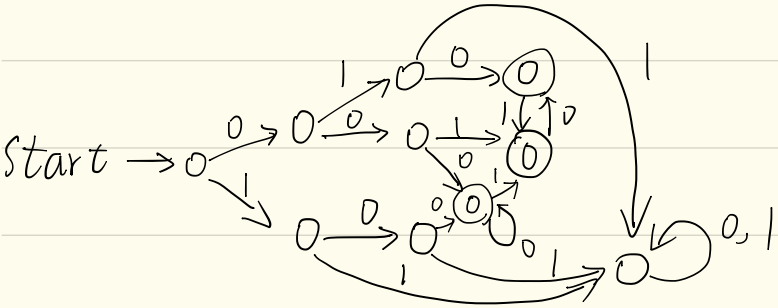
$0^*(1^*+000^*)^*0^*$

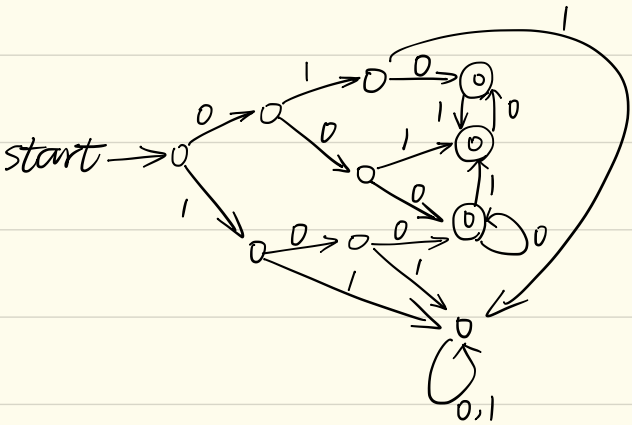
ε 0 1 10 01 010 011 101 1001

$(0+1)^*(11)+(0+1)^*$

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







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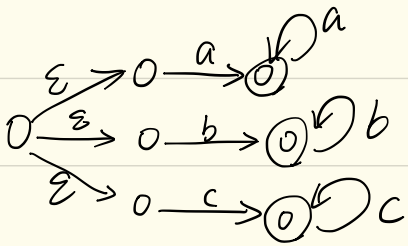
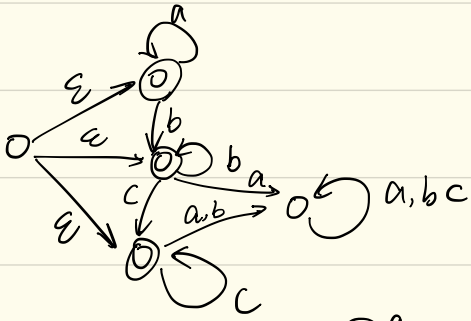
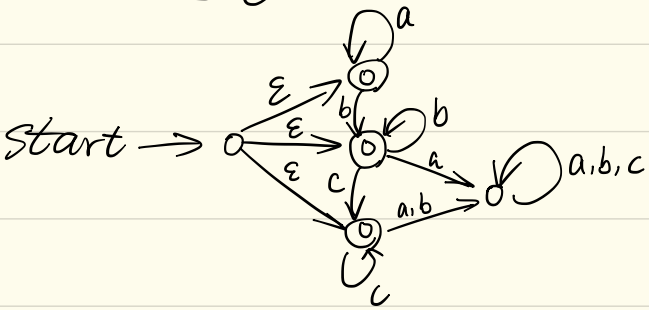


ε, a, b, c





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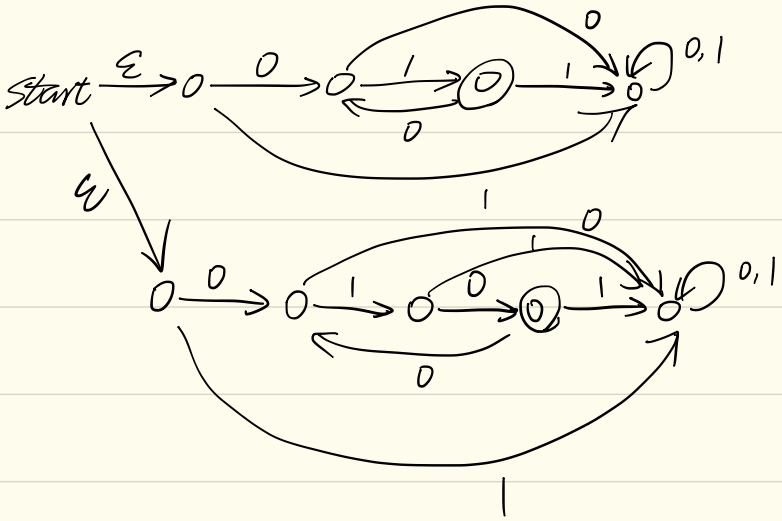
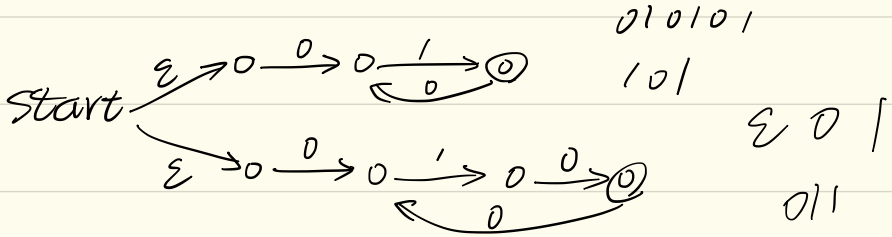
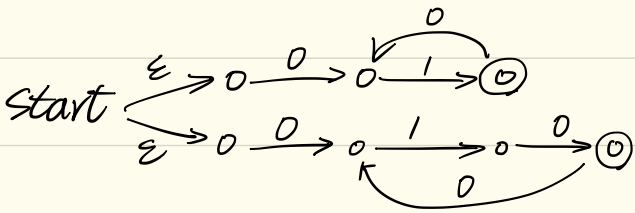






5. The set of all strings of 0's and 1's not containing 101 as a substring.

01, 10, 0, 11

ε, 0, 1, 01, 10, 11, 00,

000, 001, 010, 011

100 101 110 111

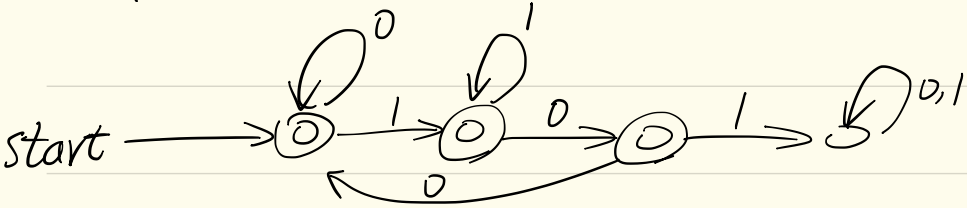
1(10,0,11)* 1, 10, 110, 111, 1010.

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

11(10,0,11)* 11,

00(01,1,00)* 00 1和1之间

10010001001111



$(0^*11^*00+\varepsilon)^*(0^*+0^*1^*+0^*11^*0)$

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

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

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

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

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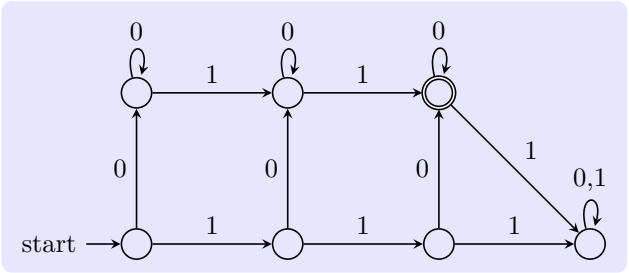

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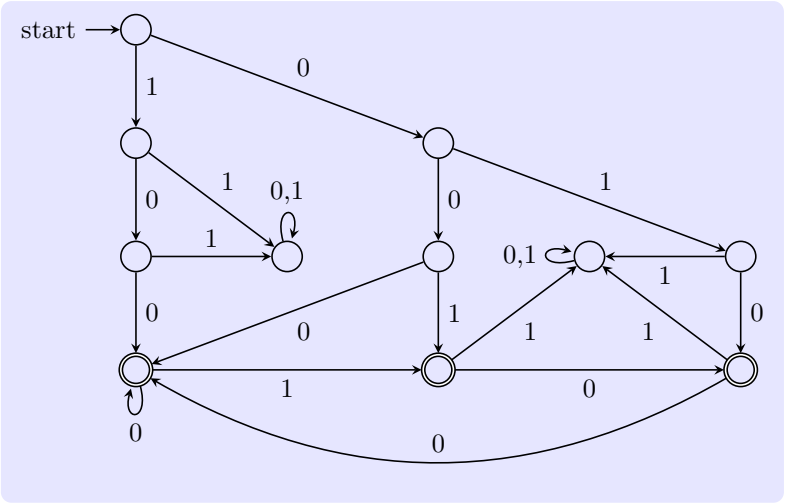

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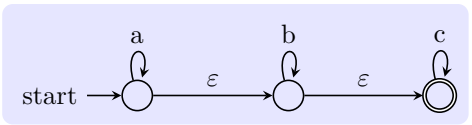

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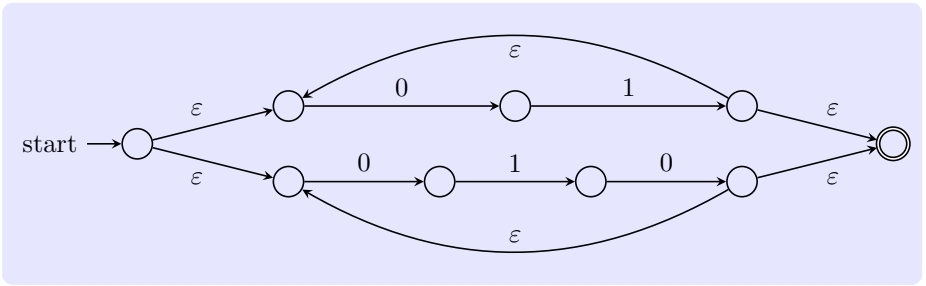

Design regular expression:

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

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