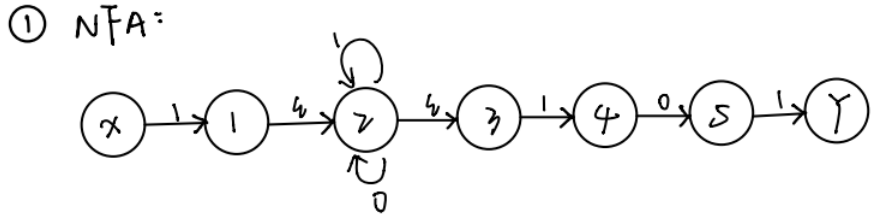
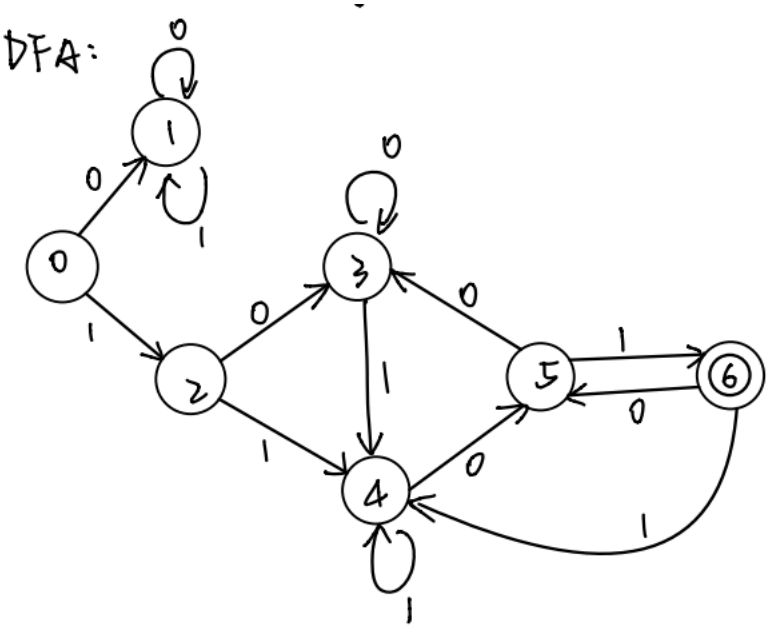
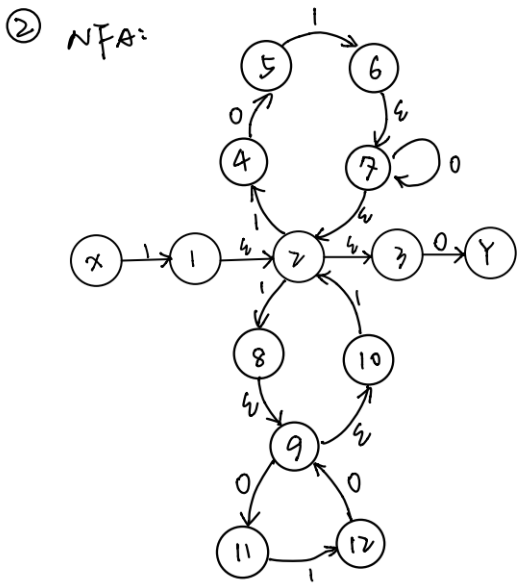
7



确定化:

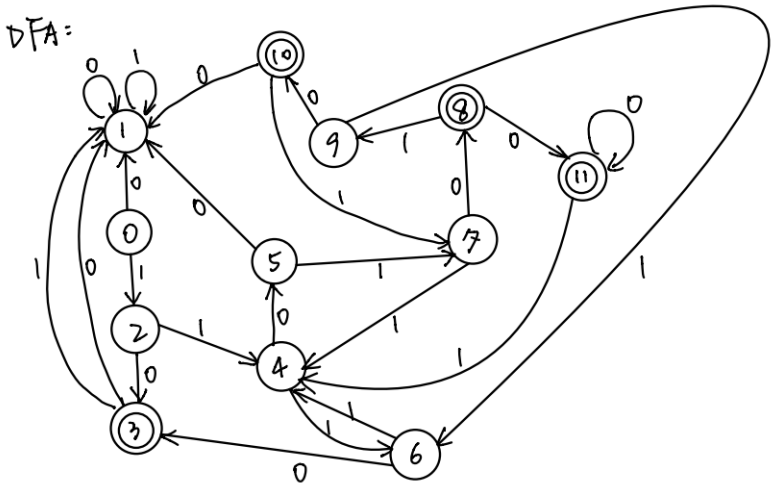
	0	1		0	1
{x}	∅	{1, 2, 3}	0	1	2
∅	∅	∅	1	1	1
{1, 2, 3}	{2, 3}	{2, 3, 4}	2	3	4
{2, 3}	{2, 3}	{2, 3, 4}	3	3	4
{2, 3, 4}	{2, 3, 5}	{2, 3, 4}	4	5	4
{2, 3, 5}	{2, 3}	{2, 3, 4, Y}	5	3	6
{2, 3, 4, Y}	{2, 3, 5}	{2, 3, 4}	6	5	4



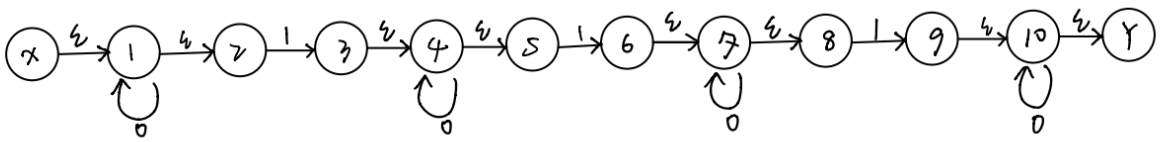


确定化:

	0	1		0	1
{x}	∅	{1, 2, 3}	0	1	2
∅	∅	∅	1	1	1
{1, 2, 3}	{Y}	{4, 8, 9, 10}	2	3	4
{Y}	∅	∅	3	1	1
{4, 8, 9, 10}	{5, 11}	{2, 3}	4	5	6
{5, 11}	∅	{6, 7, 2. 3, 12}	5	1	7
{2, 3}	{Y}	{4, 8, 9, 10}	6	3	4
{6, 7, 2, 3, 12}	{7, 2, 3, Y, 9, 10}	{4, 8, 9, 10}	7	8	4
{7, 2, 3, Y, 9, 10}	{7, 2, 3, Y}	{4, 8, 9, 10, 2, 3}	8	11	9
{4, 8, 9, 10, 2, 3}	{5, 11, Y}	{2, 3}	9	10	6
{5, 11, Y}	∅	{6, 7, 2, 3, 12}	10	1	7
{7, 2, 3, Y}	{7, 2, 3, Y}	{4, 8, 9, 10}	11	11	4

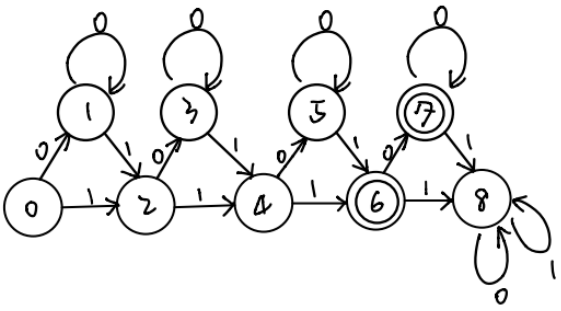


(3)



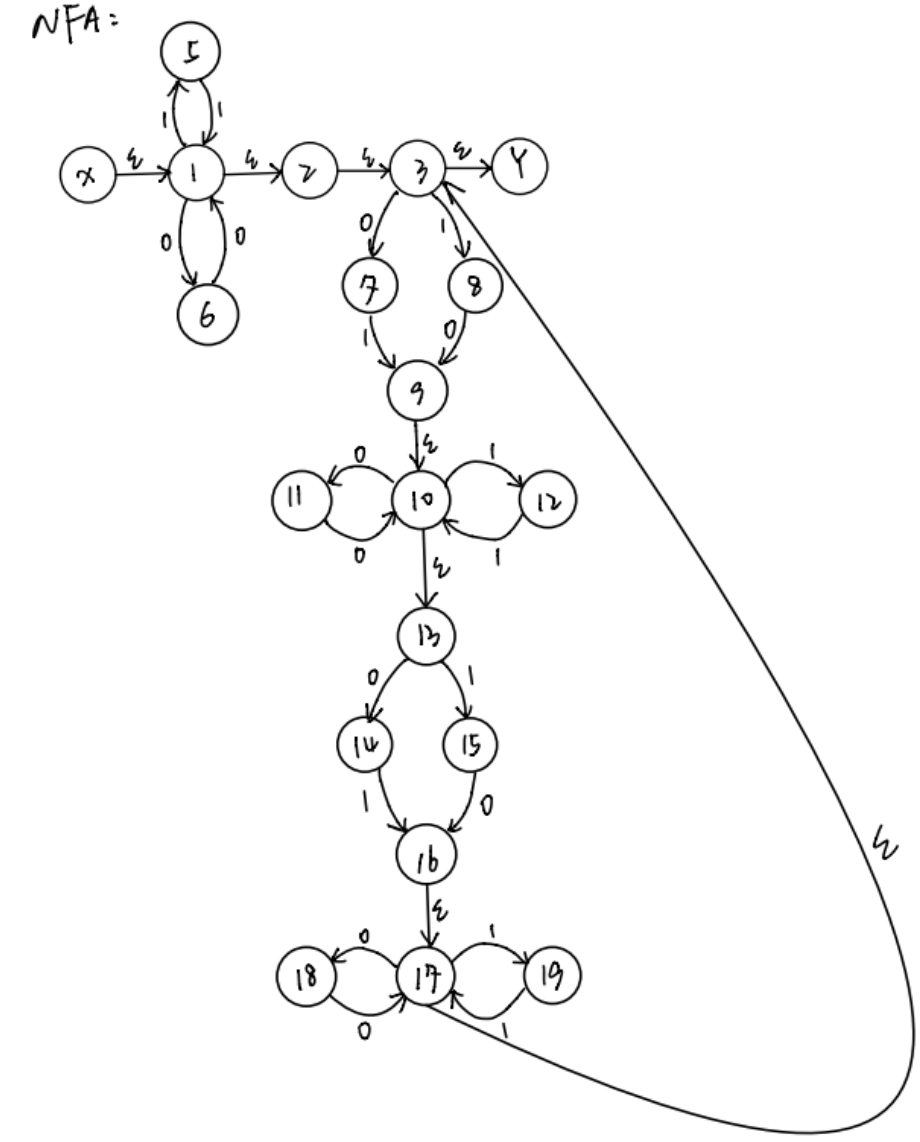
	0	1		0	1
{x, 1, 2}	{1, 2}	{3, 4, 5}	0	1	2
{1, 2}	{1, 2}	{3, 4, 5}	1	1	2
{3, 4, 5}	{4, 5}	{6, 7, 8}	2	3	4
{4, 5}	{4, 5}	{6, 7, 8}	3	3	4
{6, 7, 8}	{7, 8}	{9, 10, Y}	4	5	6
{7, 8}	{7, 8}	{9, 10, Y}	5	5	6
{9, 10, Y}	{10, Y}	∅	6	7	8
{10, Y}	{10, Y}	∅	7	7	8
∅	∅	∅	8	8	8

DFA:

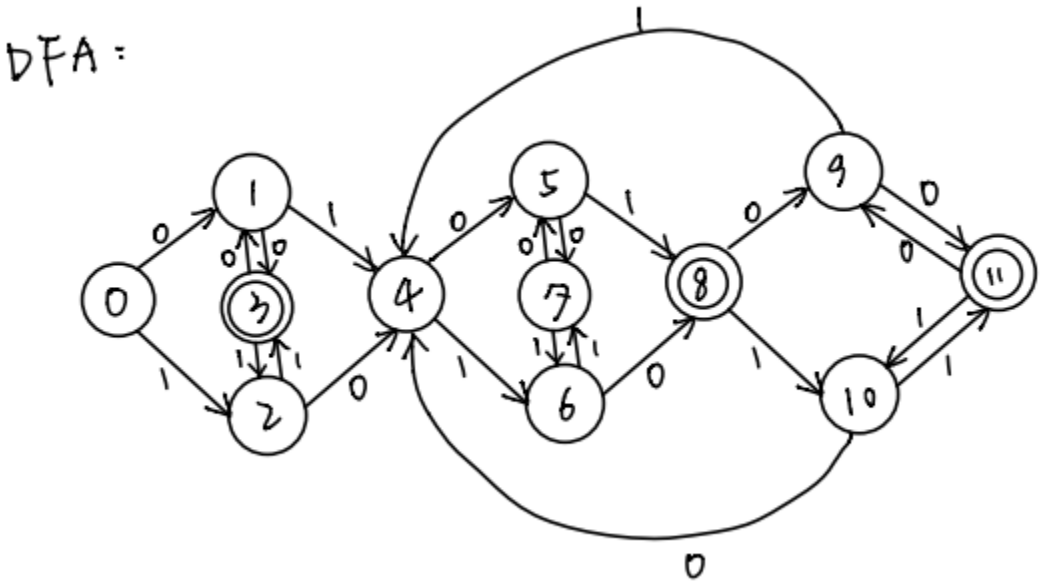


4

NFA:



	0	1		0	1
{X, 1, 2, 3, Y}	{6, 7}	{5, 8}	0	1	2
{6, 7}	{1, 2, 3, Y}	{9, 10, 13}	1	3	4
{5, 8}	{9, 10, 13}	{1, 2, 3, Y}	2	4	3
{1, 2, 3, Y}	{6, 7}	{5, 8}	3	1	2
{9, 10, 13}	{11, 14}	{12, 15}	4	5	6
{11, 14}	{10, 13}	{16, 17, 3, Y}	5	7	8
{12, 15}	{16, 17, 3, Y}	{10, 13}	6	8	7
{10, 13}	{11, 14}	{12, 15}	7	5	6
{16, 17, 3, Y}	{18, 7}	{19, 8}	8	9	10
{18, 7}	{17, 3, Y}	{9, 10, 13}	9	11	4
{19, 8}	{9, 10, 13}	{17, 3, Y}	10	4	11
{17, 3, Y}	{7, 18}	{19, 8}	11	9	10



8

(1) $(0|1)^*01$

(2)$(0|5)$ | $(1|2|3...|9)(0|1|2...|9)^*(0|5)$

(3) $0^*1(0|10^*1)^*$ | $1^*0(1|01^*0)^*$

(4) $(A|a)^*(B|b)^*...(Z|z)^*$

(5) 令 $k_i = i|\epsilon,\ i \in [0,9]$，对 0 - 9 的全排列以某种顺序进行计数标号 (从 1 到 10!)，令 $i_j (j \in [1,10])$ 表示第 i 个全排列的第 j 位

令 $sum_{i=1}^{n} r_i = r_1|r_2...|r_n$, 则所求为 $\sum_{i=1}^{10!} k_{i_1}k_{i_2}...k_{i_9}k_{i_{10}}$

(6) 使用 (5) 的定义，所求为 $\sum_{i=1}^{10!} k_i\ \sum_{i=1}^{10!} k_{i_1}k_{i_2}...k_{i_9}k_{i_{10}}$

(7) $b^*(a(b|\epsilon))^*$

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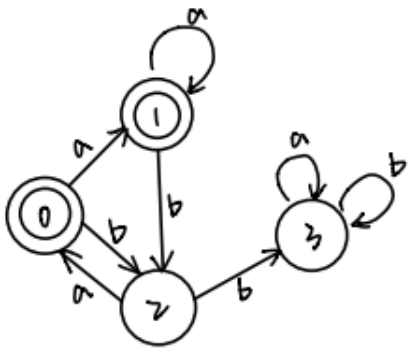
(a) 确定化:

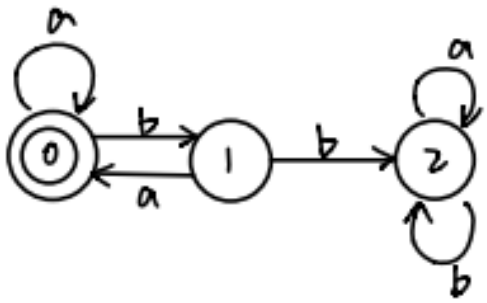
	0	1		0	1
{0}	{0, 1}	{1}	0	1	2
{0, 1}	{0, 1}	{1}	1	1	2
{1}	{0}	∅	2	0	3
∅	∅	∅	3	3	3



最少化:

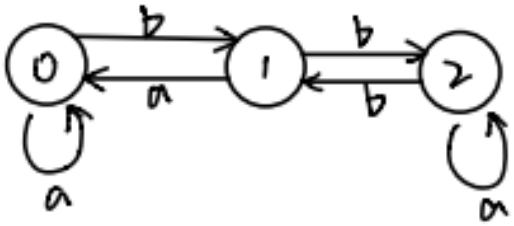
$\{0,\ 1\}, \{2,\ 3\}$
由 $\{2,3\}_a = \{0,3\},\ \{2,3\}$ 分成 $\{2\}, \{3\}$

$\{0,1\}, \{2\}, \{3\}$
$\{0,1\}_a = \{1\}, \{0,1\}_b = \{2\}$
$\{2\}_a = \{0\}, \{2\}_b = \{3\}$
$\{3\}_a = \{3\}, \{3\}_b = \{3\}$



(b) 这个有限自动机无需确定化，进行最小化：
$\{0,\ 1\}, \{2,\ 3,\ 4,\ 5\}$
由 $\{2,3,4,5\}_a = \{1,3,0,5\},\ \{2,3,4,5\}$ 分成 $\{2,4\}, \{3,5\}$

$\{0,1\}, \{2\ 4\}, \{3,5\}$
$\{0,1\}_a = \{1\}, \{0,1\}_b = \{2,4\}$
$\{2,4\}_a = \{0,1\}, \{2,4\}_b = \{3,5\}$
$\{3,5\}_a = \{3,5\}, \{3,5\}_b = \{2,4\}$



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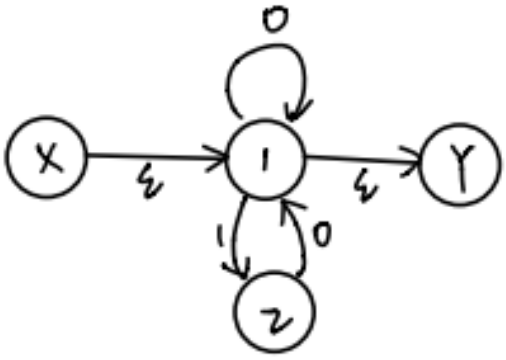
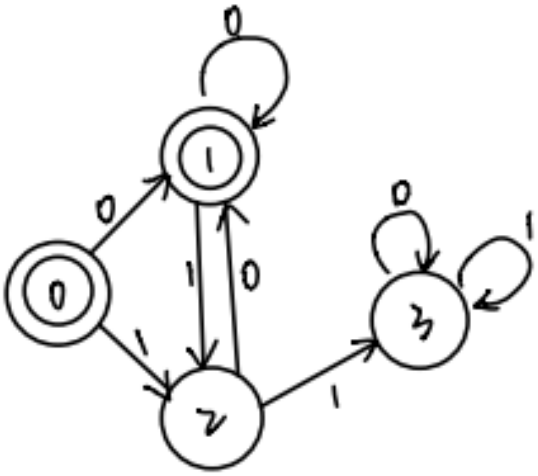
满足题意的正则式为 $(0|10)^*$



进行确定化：

	0	1		0	1
{X, 1, Y}	{1, Y}	{2}	0	1	2
{1, Y}	{1, Y}	{2}	1	1	2
{2}	{1, Y}	∅	2	1	3
∅	∅	∅	3	3	3



最少化:

$\{0, 1\}, \{2, 3\}$
由 $\{2,3\}_0 = \{1,3\},\ \{2,3\}$ 分成 $\{2\},\{3\}$

$\{0,1\},\{2\},\{3\}$
$\{0,1\}_0 = \{1\},\{0,1\}_1 = \{2\}$
$\{2\}_0 = \{1\},\{2\}_1 = \{3\}$
$\{3\}_0 = \{3\},\{3\}_1 = \{3\}$