

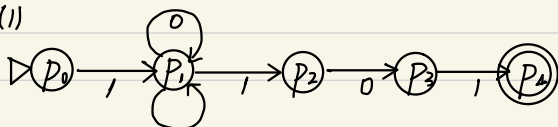
# 第三章作业 1

7. 构造下列正规式对应的 DFA

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

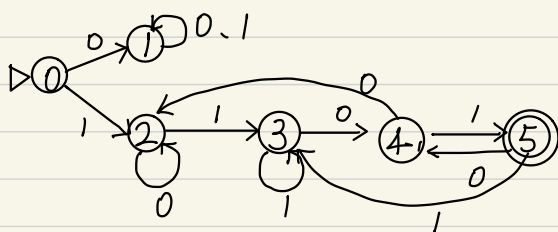
(2)  $1(1010^*|1(010)^*1)^*0$

解: (1)



确定化:

	1	0	1
$\rightarrow [p_0]$		$\emptyset$	$\{p_1\}$
$\{p_1\}$	$\{p_1\}$	$\{p_1\}$	$\{p_1, p_2\}$
$\{p_1, p_2\}$	$\{p_1, p_3\}$	$\{p_1, p_3\}$	$\{p_1, p_2\}$
$\{p_1, p_3\}$	$\{p_1\}$	$\{p_1\}$	$\{p_1, p_2, p_4\}$
$0\{p_1, p_2, p_4\}$	$\{p_1, p_3\}$	$\{p_1, p_3\}$	$\{p_1, p_2\}$
$\emptyset$	$\emptyset$	$\emptyset$	$\emptyset$



最小化:  $\{0, 1, 2, 3, 4\} \quad \{5\}$

$\{0, 1, 2, 3, 4\}_0 = \{0, 1, 2, 4\} \quad \{0, 1, 2, 3, 4\}_1 = \{2, 1, 3, 5\}$

$\{0, 1, 2, 3\} \quad \{4\} \quad \{5\}$

$\{0, 1, 2, 3\}_0 = \{0, 1, 2, 4\} \quad \{0, 1, 2, 3\}_1 = \{2, 1, 3\}$

$\{0, 1, 2\} \quad \{3\} \quad \{4\} \quad \{5\}$

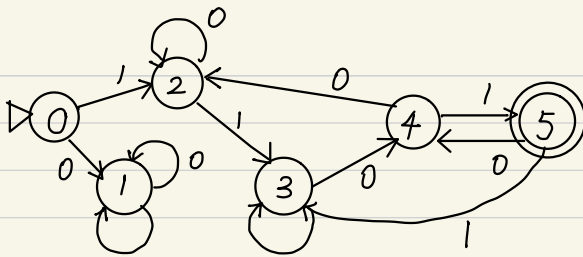
$\{0, 1, 2\}_0 = \{1, 2\} \quad \{0, 1, 2\}_1 = \{2, 1, 3\}$

$\{0, 1\} \quad \{2\} \quad \{3\} \quad \{4\} \quad \{5\}$

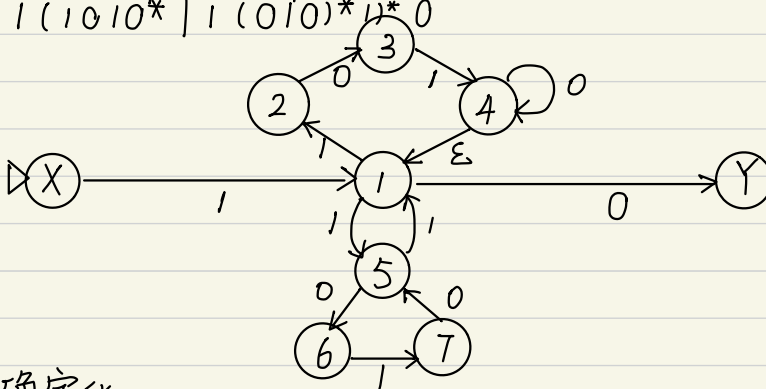
$\{0, 1\}_0 = \{1, 0\} \quad \{0, 1\}_1 = \{2, 1\}$

$\{0\} \quad \{1\} \quad \{2\} \quad \{3\} \quad \{4\} \quad \{5\}$

故对应的 DFA 为



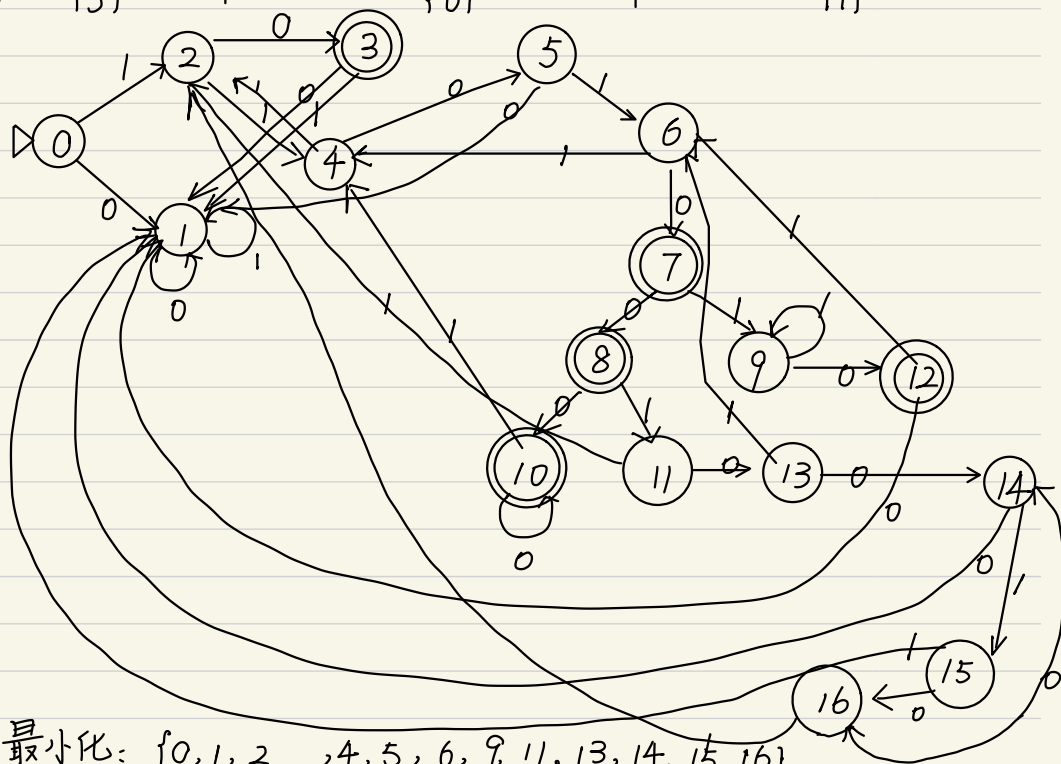
(2)  $1(1010^* | 1(010)^*1)^*0$



确定化:

		0	1
0	$\rightarrow \{X\}$	$\emptyset$	$\{1\}$
1	$\emptyset$	$\emptyset$	$\emptyset$
2	$\{1\}$	$\{Y\}$	$\{2, 5\}$
3	$\circ \{Y\}$	$\emptyset$	$\emptyset$
4	$\{2, 5\}$	$\{3, 6\}$	$\{1\}$
5	$\{3, 6\}$	$\emptyset$	$\{4, 1, 7\}$
6	$\{4, 1, 7\}$	$\{4, 1, Y, 5\}$	$\{2, 5\}$
7	$\circ \{4, 1, Y, 5\}$	$\{4, 1, Y, 6\}$	$\{2, 5, 1\}$
8	$\circ \{4, 1, Y, 6\}$	$\{4, 1, Y\}$	$\{2, 5, 7\}$
9	$\{2, 5, 1\}$	$\{3, 6, Y\}$	$\{1, 2, 5\}$
10	$\circ \{4, 1, Y\}$	$\{4, 1, Y\}$	$\{2, 5\}$
11	$\{2, 5, 7\}$	$\{3, 6, 5\}$	$\{1\}$
12	$\circ \{3, 6, Y\}$	$\emptyset$	$\{4, 1, 7\}$
13	$\{3, 6, 5\}$	$\{6\}$	$\{4, 1, 7\}$

		0	1
14	{6}	$\emptyset$	{7}
15	{7}	{5}	$\emptyset$
16	{5}	{6}	{1}



最小化: {0, 1, 2, 4, 5, 6, 9, 11, 13, 14, 15, 16}  
{3, 7, 8, 10, 12}

{0, 1, 2, 4, 5, 6, 9, 11, 13, 14, 15, 16} =

{1, 1, 3, 5, 1, 7, 12, 13, 14, 1, 16, 14}

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

{3, 7, 8, 10, 12} = {1, 8, 10, 10, 1}

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

{0, 1, 4, 5, 11, 13, 14, 15, 16} = {1, 1, 2, 6, 2, 6, 15, 1, 2}

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

$$\{4, 5, 11, 13, 16\}_0 = \{5, 1, 13, 14, 14\}$$

$$\{4, 11\}_1 \{5, 13, 16\} \{0, 1, 14, 15\} \{2, 6, 9\} \{7, 8, 10\} \{3, 12\}$$

$$\{3, 12\}_1 = \{1, 6\} \quad \{4, 11\}_1 = \{2, 2\}$$

$$\{0, 1, 14, 15\}_0 = \{1, 1, 1, 16\}$$

$$\{0, 1, 14\} \{15\} \{4, 11\} \{5, 13, 16\} \{2, 6, 9\} \{7, 8, 10\} \{3\} \{12\}$$

$$\{7, 8, 10\}_0 = \{8, 10, 10\} \quad \{7, 8, 10\}_1 = \{9, 11, 4\}$$

$$\{0, 1, 14\}_1 = \{2, 1, 15\}$$

$$\{0\} \{1\} \{14\} \{15\} \{4, 11\} \{5, 13, 16\} \{2, 6, 9\} \{7\} \{8, 10\} \{3\} \{12\}$$

$$\{5, 13, 16\}_0 = \{1, 14, 14\} \quad \{5, 13, 16\}_1 = \{6, 6, 2\}$$

$$\{2, 6, 9\}_0 = \{3, 7, 12\} \quad \{2, 6, 9\}_1 = \{4, 4, 9\}$$

$$\{0\} \{1\} \{14\} \{15\} \{4, 11\} \{5\} \{13, 16\} \{2\} \{6\} \{9\} \{3\} \{7\} \{12\}$$

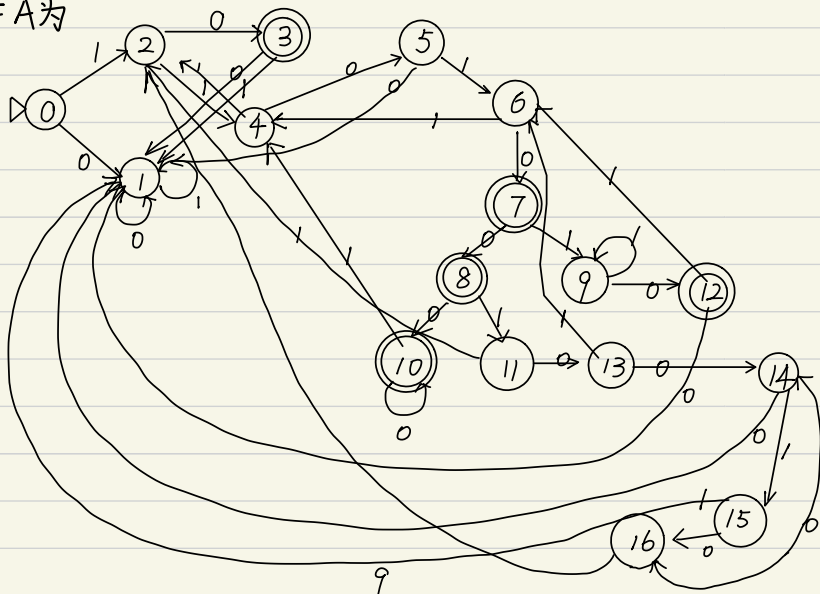
$$\{7\} \{8, 10\}$$

$$\{4, 11\}_0 = \{5, 13\} \quad \{13, 16\}_1 = \{6, 2\}$$

$$\{8, 10\}_0 = \{10, 10\} \quad \{8, 10\}_1 = \{11, 4\} \quad \{16\}$$

$$\{0\} \{1\} \{2\} \{3\} \{4\} \{5\} \{6\} \{7\} \{8\} \{9\} \{10\} \{11\} \{12\} \{13\} \{14\} \{15\}$$

最终的DFA为



8. 给出下面正规表达式:

(1) 以 01 结尾的二进制数串

(2) 能被 5 整除的二进制整数

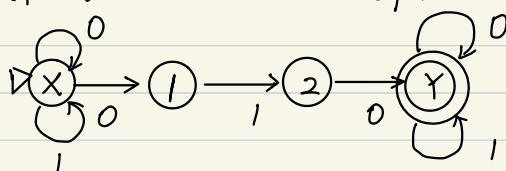
解: (1)  $(0/1)^* 01$

(2)  $(1/2/3/4/5/6/7/8/9)(0/1/2/3/4/5/6/7/8/9)^*(0/5) \mid (0/5)$

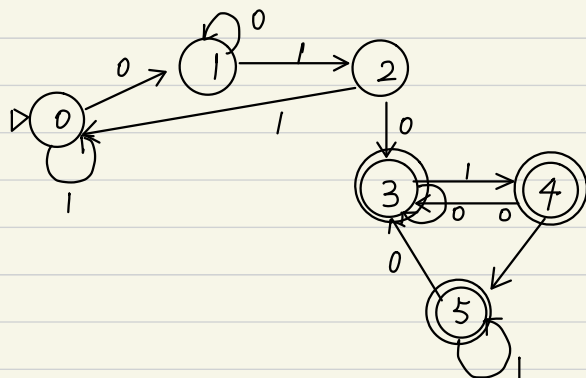
9. 对下面情况给出 DFA 及正规表达式

(1)  $\{0,1\}$  上的含有子串 010 的所有串

解: 正规表达式:  $(0/1)^* 010 (0/1)^*$



	0	1
$\rightarrow \{X\}$	$\{X, 1\}$	$\{X\}$
$\{X, 1\}$	$\{X, 1\}$	$\{X, 2\}$
$\{X, 2\}$	$\{X, 1, Y\}$	$\{X\}$
$0\{X, 1, Y\}$	$\{X, 1, Y\}$	$\{X, 2, Y\}$
$0\{X, 2, Y\}$	$\{X, 1, Y\}$	$\{X, Y\}$
$0\{X, Y\}$	$\{X, 1, Y\}$	$\{X, Y\}$



最小化

$\{0, 1, 2\}$        $\{3, 4, 5\}$

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

$\{3, 4, 5\}_0 = \{3, 3, 3\}$        $\{3, 4, 5\}_1 = \{4, 5, 5\}$

$\{0, 1\}$      $\{2\}$      $\{3, 4, 5\}$

$\{0\}$     $\{1\}$     $\{2\}$        $\{3, 4, 5\}$

化简后:

