数字电路基础　第八周作业

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作业内容：6.5，6.7，6.35，6.10，6.12，6.19，6.22，6.29

Problem 6.5

两个 D 触发器都是下降沿触发的，分析其更新规则：

$Q'_{1,n+1} = AQ'_{2,n}$

$Q'_{2,n+1} = A(Q'_{2,n}Q'_{1,n})'$

$Y = AQ'_1Q_2$

那么分析其变化

```
A   Q1n'   Q2n'   Q1n+1'   Q2n+2'   Y
0   x      x      1        1        0 -> 0
1   0      0      1        0        0 -> 1
1   1      0      1        0        1 -> 1
1   0      1      0        0        0 -> 0
1   1      1      0        1        0 -> 0
```
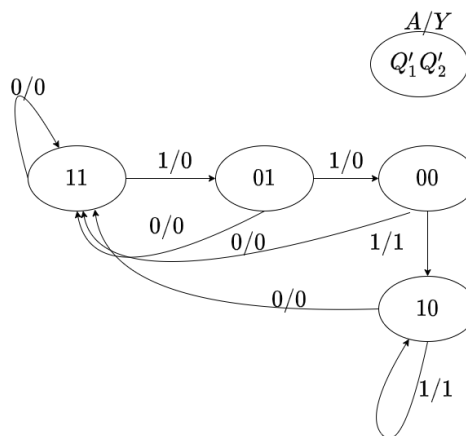
状态图为 **图 1**

图 1: 状态图

Problem 6.7

首先，所有触发器的时钟沿一致，接下来分析更新规则：转换图如 **图 2**。

$Q_{0,n+1} = Q'_{0,n}, J = 1, K = 1$

$Q_{1,n+1} = (Q'_{0,n}(Q'_{2,n}Q'_{3,n})')' \cdot Q'_{1,n} + Q_{0,n}Q_{1,n}, J = (Q'_{0,n}(Q'_{2,n}Q'_{3,n})'), K = Q'_{0,n}$

$$Q_{2,n+1} = (Q_{3,n}Q'_{0,n}) \cdot Q'_{2,n} + (Q'_{1,n}Q'_{0,n})'Q_{2,n}, J = (Q_{3,n}Q'_{0,n}), K = (Q'_{1,n}Q'_{0,n})$$

$$Q_{3,n+1} = (Q'_{2,n}Q'_{1,n}Q'_{0,n}) \cdot Q'_{3,n} + Q_{0,n}Q_{3,n}, J = (Q'_{2,n}Q'_{1,n}Q'_{0,n}), K = Q_{0,n}$$

$$Y = (Q'_0Q'_1Q'_2Q'_3)$$

```
Q0   Q1   Q2   Q3    Q0n  Q1n  Q2n  Q3n  Y
0    0    0    0     1    0    0    1    1->0   %  0
1    0    0    1     0    0    0    1    0->0   %  9
0    0    0    1     1    1    1    0    0->0   %  1
1    1    1    0     0    1    1    0    0->0   %  14
0    1    1    0     1    0    1    0    0->0   %  6
1    0    1    0     0    0    1    0    0->0   %  10
0    0    1    0     1    1    0    0    0->0   %  2
1    1    0    0     0    1    0    0    0->0   %  12
0    1    0    0     1    0    0    0    0->0   %  4
1    0    0    0     0    0    0    0    0->1   %  8
%  3  5   7   11    13   15
0    0    1    1     1    1    0    0    0->0
0    1    0    1     1    0    1    0    0->0
0    1    1    1     1    0    1    0    0->0
1    0    1    1     0    0    1    1    0->0
1    1    0    1     0    1    0    1    0->0
1    1    1    1     0    1    1    1    0->0
```
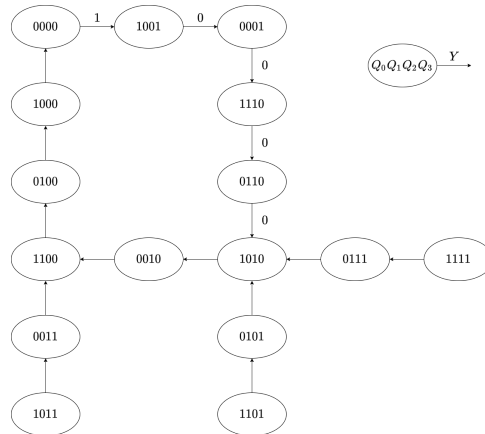

图 2: 6.7

Problem 6.35

转换图如 **图 3** 。

```
state_name    in      next        else
state_0       1       state_1     state_0
state_1       1       state_2     state_0
state_2       1       state_3     state_0
state_3       1       state_4     state_0
state_4       1       state_4     state_0
```
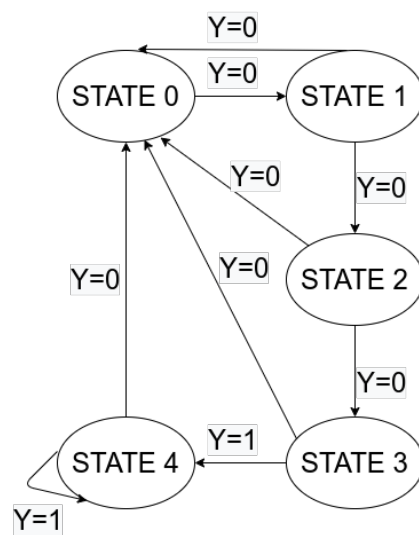
图 3: 6.35