



| | Present state $Q_0 Q_1 Q_2$ | Input In | Next state $Q_0 Q_1 Q_2$ | out put out |
|---|--------------------------------|-------------|-----------------------------|----------------|
| ① | 000 | 0 | 000 | 1 |
| | 000 | 1 | 001 | 0 |
| ② | 001 | 0 | 010 | 0 |
| | 001 | 1 | 011 | 0 |
| ③ | 010 | 0 | 100 | 0 |
| | 010 | 1 | 000 | 1 |
| ④ | 011 | 0 | 001 | 0 |
| | 011 | 1 | 010 | 0 |
| ⑤ | 100 | 0 | 011 | 0 |
| | 100 | 1 | 100 | 0 |

$$\begin{aligned}
 \text{out} &= \bar{Q}_0 \bar{Q}_1 \bar{Q}_2 \bar{I} + \bar{Q}_0 Q_1 \bar{Q}_2 I \\
 &= \bar{Q}_0 \bar{Q}_2 (\bar{Q}_1 \bar{I} + Q_1 I) \\
 &= \bar{Q}_0 \bar{Q}_2 (\overline{Q_1 \oplus I})
 \end{aligned}$$

$$D_0 = \bar{Q}_0 Q_1 \bar{Q}_2 \bar{I} + Q_0 \bar{Q}_1 \bar{Q}_2 I$$

$$\begin{aligned}
 D_1 &= \bar{Q}_0 \bar{Q}_1 Q_2 \bar{I} + \bar{Q}_0 \bar{Q}_1 Q_2 I \\
 &\quad + \bar{Q}_0 Q_1 \bar{Q}_2 \bar{I} + Q_0 \bar{Q}_1 \bar{Q}_2 I \\
 &= \bar{Q}_0 Q_2 I (\cancel{Q_1 + \bar{Q}_1}) \\
 &\quad + \bar{Q}_1 \bar{I} (\bar{Q}_0 Q_2 + Q_0 \bar{Q}_2) \\
 &= \bar{Q}_0 Q_2 I + \bar{Q}_1 \bar{I} (Q_0 \oplus Q_2)
 \end{aligned}$$

$$\begin{aligned} D_2 &= \bar{Q}_0 \bar{Q}_1 \bar{Q}_2 I + \bar{Q}_0 \bar{Q}_1 Q_2 I \\ &\quad + \bar{Q}_0 Q_1 \bar{Q}_2 \bar{I} + Q_0 \bar{Q}_1 \bar{Q}_2 \bar{I} \\ &= \bar{Q}_0 \bar{Q}_1 I (\cancel{\bar{Q}_2 + Q_2}) \\ &\quad + \bar{Q}_0 Q_1 \bar{Q}_2 \bar{I} + Q_0 \bar{Q}_1 \bar{Q}_2 \bar{I} \end{aligned}$$