Homework #3

Figure 7-56 gives the outputs for each state, no 2 states have the same outputs

∴ no equivalent states exist

The state transition table is given in Table 7-14 (pg 576). Since there are 3 FFs and 3 inputs you can't use 1 K-map.

Fortunately, Q_1 and Q_0 are simple enough so that K-maps may not be req'd.

e.g., Q_0 (equivalently D_0) = 1 when

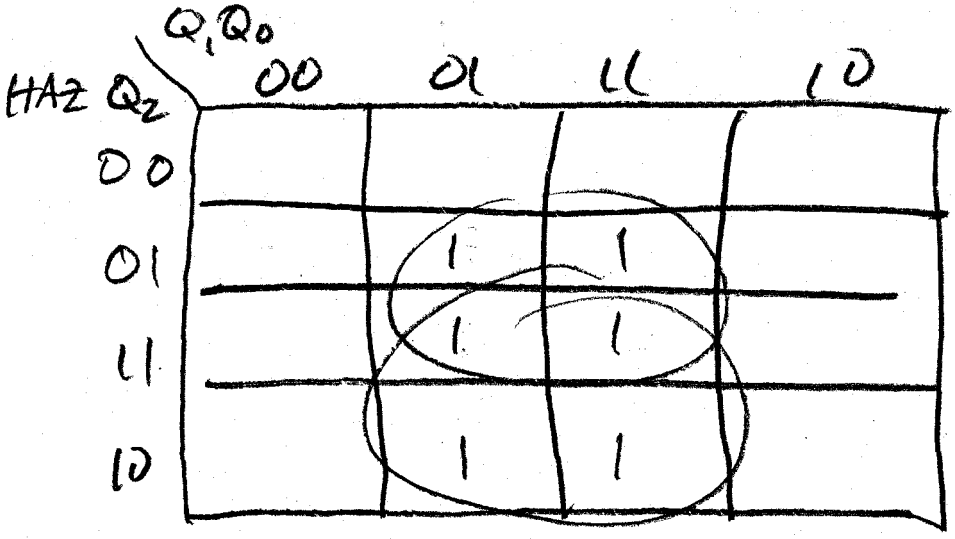
$$D_0 = \bar{Q}_2 \cdot \bar{Q}_1 \cdot \bar{Q}_0 \cdot \left[\bar{L} \cdot \bar{R} \cdot H + L \cdot R \cdot \bar{H}\right] + \underbrace{\bar{Q}_2 \cdot \bar{Q}_1 \cdot Q_0 \cdot \bar{H} + Q_2 \cdot \bar{Q}_1 \cdot Q_0 \cdot \bar{H}}_{\bar{Q}_1 \cdot Q_0 \cdot \bar{H}}$$

$$= \bar{Q}_2 \cdot \bar{Q}_1 \cdot \bar{Q}_0 \cdot \bar{H} \cdot \left[L \oplus R\right]$$

$$D_1 = \underbrace{\bar{Q}_2 \cdot \bar{Q}_1 \cdot Q_0 \cdot \bar{H} + \bar{Q}_2 \cdot Q_1 \cdot Q_0 \cdot \bar{H}}_{\bar{Q}_2 \cdot Q_0 \cdot \bar{H}} + \underbrace{Q_2 \cdot \bar{Q}_1 \cdot Q_0 \cdot \bar{H} + Q_2 \cdot Q_1 \cdot Q_0 \cdot \bar{H}}_{Q_2 \cdot Q_0 \cdot \bar{H}}$$

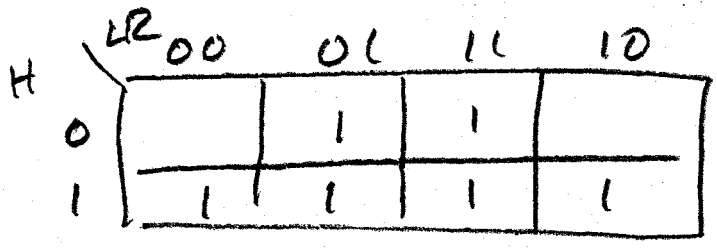
$$= Q_0 \cdot \bar{H}$$

for D_3 notice that 6 of the 8 times it is a Logic 1 it is only a function of HAZ, Q_2, Q_1 and Q_0



$$D_{3A} = H \cdot Q_0 + Q_2 \cdot Q_0$$

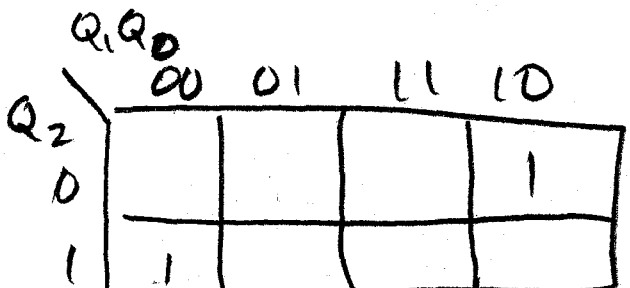
for the last 2 instances $Q_2 = Q_1 = Q_0$, So



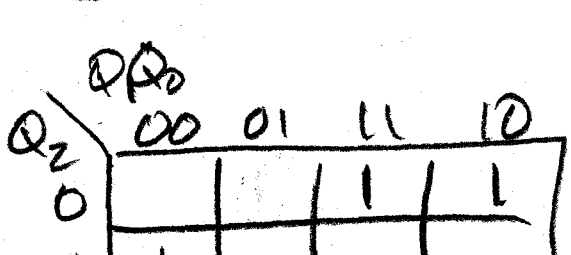
$$D_{3B} = \bar{Q}_2 \bar{Q}_1 \bar{Q}_0 \cdot [H + R]$$

$$\therefore \quad D = D_{3A} + D_{3B}$$

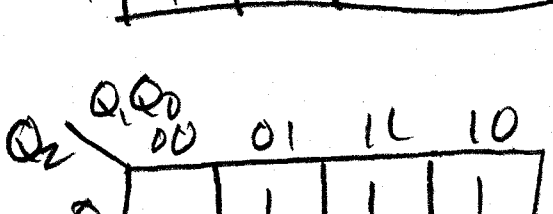
$$= H \cdot Q_0 + Q_2 \cdot Q_0 + \bar{Q}_2 \bar{Q}_1 H + \bar{Q}_2 \bar{Q}_1 \bar{Q}_0 R$$



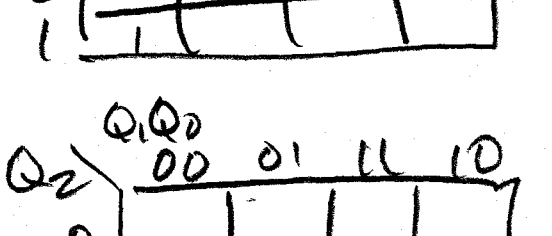
$$LC = Q_2\bar{Q}_1\bar{Q}_0 + \bar{Q}_2Q_1\bar{Q}_0$$



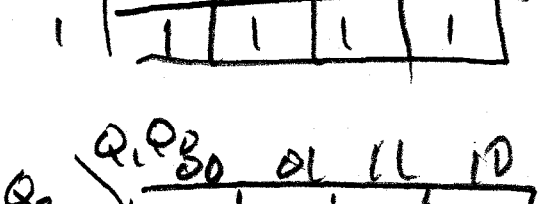
$$LB = Q_2\bar{Q}_1\bar{Q}_0 + \bar{Q}_2Q_1$$



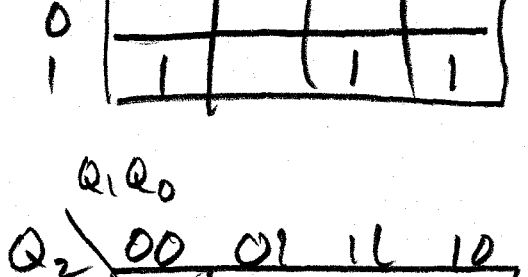
$$LA = Q_2\bar{Q}_1\bar{Q}_0 + \bar{Q}_2Q_0 + \bar{Q}_2Q$$



$$RA = Q_2$$



$$RB = Q_2\bar{Q}_0 + Q_2Q_1$$



$$RC = Q_2\bar{Q}_0$$