

P Q R	P B
0 0 0	0 0
0 0 1	1 1
0 1 0	1 1
0 1 1	0 1
1 0 0	1 0
1 0 1	0 0
1 1 0	0 0
1 1 1	1 1

K-maps

for P:

P \ QR	00	01	11	10
0		1		1
1	1		1	

$$\begin{aligned}
 D &= \bar{P}\bar{Q}R + \bar{P}Q\bar{R} + P\bar{Q}\bar{R} + PQ R \\
 &= \bar{P}(\bar{Q}R + Q\bar{R}) + P(\bar{\bar{Q}\bar{R}} + \bar{Q}R) \\
 &= \bar{P}(Q \oplus R) + P(\overline{Q \oplus R}) \\
 &= P \oplus Q \oplus R
 \end{aligned}$$

for B

P \ QR	00	01	11	10
0		1	1	1
1			1	

$$\begin{aligned}
 B &= \bar{P}Q + \bar{P}Q\bar{R} + PQ R \\
 &= \bar{P}Q + R \overline{P \oplus R}
 \end{aligned}$$