

$$7. \quad 2^n \cdot 2^{\frac{n(n-1)}{2}} = 2^{\frac{n(n+1)}{2}} \quad \leftarrow$$

- (i) \emptyset
- (ii) $\{(0,0)\}$
- (iii) $\{(1,1)\}$
- (iv) $\{(0,0), (1,1)\}$
- (v) $\{(0,1), (1,0)\}$
- (vi) $\{(0,0), (0,1), (1,0)\}$
- (vii) $\{(1,1), (0,1), (1,0)\}$
- (viii) $\{(0,0), (1,1), (0,1), (1,0)\}$

$$8. \quad M_R = \begin{bmatrix} 1 & 0 & 1 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}, \quad M_S = \begin{bmatrix} 0 & 1 & 0 \\ 1 & 0 & 1 \\ 0 & 1 & 0 \end{bmatrix}$$

$$(a) \quad M_R \vee M_S = \begin{bmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \\ 0 & 1 & 1 \end{bmatrix} \quad \leftarrow$$

$$(b) \quad M_R \wedge M_S = \begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix} \quad \leftarrow$$

$$(c) \quad M_{S \oplus R} = \begin{bmatrix} m_{11} & m_{12} & m_{13} \\ m_{21} & m_{22} & m_{23} \\ m_{31} & m_{32} & m_{33} \end{bmatrix}$$

$$\begin{aligned} m_{11} &= (0 \wedge 1) \vee (1 \wedge 0) \vee (0 \wedge 0) & m_{21} &= (1 \wedge 1) \vee (0 \wedge 0) \vee (1 \wedge 0) & m_{31} &= (0 \wedge 1) \vee (1 \wedge 0) \vee (0 \wedge 0) \\ &= 0 \vee 0 \vee 0 & &= 1 \vee 0 \vee 0 & &= 0 \vee 0 \vee 0 \\ &= 0 & &= 1 & &= 0 \\ m_{12} &= (0 \wedge 0) \vee (1 \wedge 1) \vee (0 \wedge 0) & m_{22} &= (1 \wedge 0) \vee (0 \wedge 1) \vee (1 \wedge 0) & m_{32} &= (0 \wedge 0) \vee (1 \wedge 1) \vee (0 \wedge 0) \\ &= 0 \vee 1 \vee 0 & &= 0 \vee 0 \vee 0 & &= 0 \vee 1 \vee 0 \\ &= 1 & &= 0 & &= 1 \\ m_{13} &= (0 \wedge 1) \vee (1 \wedge 0) \vee (0 \wedge 1) & m_{23} &= (1 \wedge 1) \vee (0 \wedge 0) \vee (1 \wedge 0) & m_{33} &= (0 \wedge 1) \vee (1 \wedge 0) \vee (0 \wedge 1) \\ &= 0 \vee 0 \vee 0 & &= 1 \vee 0 \vee 1 & &= 0 \vee 0 \vee 0 \\ &= 0 & &= 1 & &= 0 \end{aligned}$$

$$\Rightarrow M_S \odot M_R = \begin{bmatrix} 0 & 1 & 0 \\ 1 & 0 & 1 \\ 0 & 1 & 0 \end{bmatrix} \quad \leftarrow$$

Nilroy