2.2

$$\begin{aligned}(x+y)\cdot(x+\overline{y}) &= xx+xy+x\overline{y}+y\overline{y}\\ &= x+xy+x\overline{y}+0\\ &= x(1+y+\overline{y})\\ &= x\cdot 1\\ &= x\end{aligned}$$

2.10

$$\begin{aligned}f &= \overline{x}_1\overline{x}_2x_3+\overline{x}_1x_2\overline{x}_3+\overline{x}_1x_2x_3+x_1\overline{x}_2\overline{x}_3+x_1\overline{x}_2x_3+x_1x_2\overline{x}_3+x_1x_2x_3\\ &= x_1(\overline{x}_2\overline{x}_3+\overline{x}_2x_3+x_2\overline{x}_3+x_2x_3)+x_2(\overline{x}_1\overline{x}_3+\overline{x}_1x_3+x_1\overline{x}_3+x_1x_3)\\ &\quad +x_3(\overline{x}_1\overline{x}_2+\overline{x}_1x_2+x_1\overline{x}_2+x_1x_2)\\ &= x_1(\overline{x}_2(\overline{x}_3+x_3)+x_2(\overline{x}_3+x_3))+x_2(\overline{x}_1(\overline{x}_3+x_3)+x_1(\overline{x}_3+x_3))\\ &\quad +x_3(\overline{x}_1(\overline{x}_2+x_2)+x_1(\overline{x}_2+x_2))\\ &= x_1(\overline{x}_2\cdot 1+x_2\cdot 1)+x_2(\overline{x}_1\cdot 1+x_1\cdot 1)+x_3(\overline{x}_1\cdot 1+x_1\cdot 1)\\ &= x_1(\overline{x}_2+x_2)+x_2(\overline{x}_1+x_1)+x_3(\overline{x}_1+x_1)\\ &= x_1\cdot 1+x_2\cdot 1+x_3\cdot 1\\ &= x_1+x_2+x_3\end{aligned}$$

2.13

$$\begin{aligned}f &= x_1\overline{x}_2\overline{x}_3+x_1x_2x_4+x_1\overline{x}_2x_3\overline{x}_4\\ &= x_1\overline{x}_2\overline{x}_3(\overline{x}_4+x_4)+x_1x_2x_4+x_1\overline{x}_2x_3\overline{x}_4\\ &= x_1\overline{x}_2\overline{x}_3\overline{x}_4+x_1\overline{x}_2\overline{x}_3x_4+x_1x_2x_4+x_1\overline{x}_2x_3\overline{x}_4\\ &= x_1\overline{x}_2\overline{x}_3+x_1\overline{x}_2(\overline{x}_3+x_3)\overline{x}_4+x_1x_2x_4\\ &= x_1\overline{x}_2\overline{x}_3+x_1\overline{x}_2\overline{x}_4+x_1x_2x_4\end{aligned}$$

2.24

$$\begin{aligned}f &= x_1\overline{x}_3\overline{x}_4+x_2\overline{x}_3x_4+x_1\overline{x}_2\overline{x}_3\\ &= x_1\overline{x}_3\overline{x}_4+x_2\overline{x}_3x_4+x_1x_2\overline{x}_3+x_1\overline{x}_2\overline{x}_3\\ &= x_1\overline{x}_3\overline{x}_4+x_2\overline{x}_3x_4+x_1\overline{x}_3\\ &= x_2\overline{x}_3x_4+x_1\overline{x}_3\end{aligned}$$

2.21

$$
\begin{aligned}
f &= \overline{x}_1\overline{x}_2x_3 + \overline{x}_1x_2x_3 + x_1\overline{x}_2\overline{x}_3 + x_1x_2\overline{x}_3 + x_1x_2x_3 \\
&= \overline{x}_1(\overline{x}_2 + x_2)x_3 + x_1(\overline{x}_2 + x_2)\overline{x}_3 + (\overline{x}_1 + x_1)x_2x_3 \\
&= \overline{x}_1x_3 + x_1\overline{x}_3 + x_2x_3
\end{aligned}
$$

$$
f = \overline{x}_1x_3 + x_1\overline{x}_3 + x_1x_2
$$

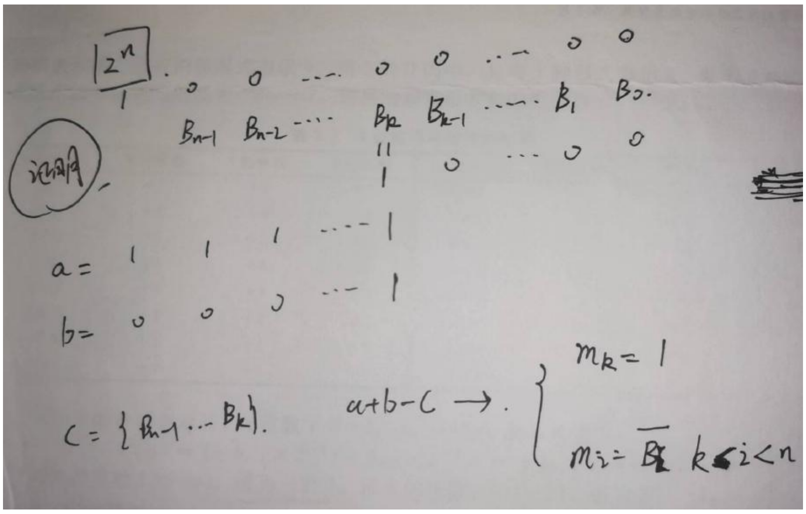
3.2

$$
\begin{aligned}
&(a)\ \ 478 \\
&(b)\ \ -280 \\
&(c)\ \ -1
\end{aligned}
$$

3.3

$$
\begin{aligned}
&(a)\ \ 478 \\
&(b)\ \ -281 \\
&(c)\ \ -2
\end{aligned}
$$

3.8（给出一种证明方法提示，详细步骤请自行补充）



3.10

Since $s_k = x_k \oplus y_k \oplus c_k$, it follows that

$$\begin{aligned} x_k \oplus y_k \oplus s_k &= (x_k \oplus y_k) \oplus (x_k \oplus y_k \oplus c_k) \\ &= (x_k \oplus y_k) \oplus (x_k \oplus y_k) \oplus c_k \\ &= 0 \oplus c_k \\ &= c_k \end{aligned}$$