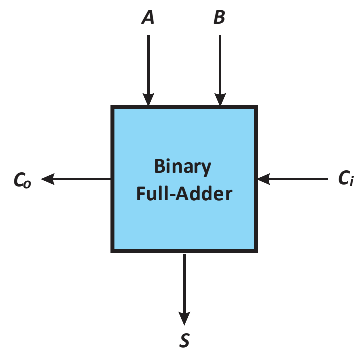
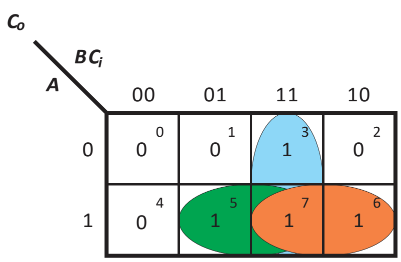


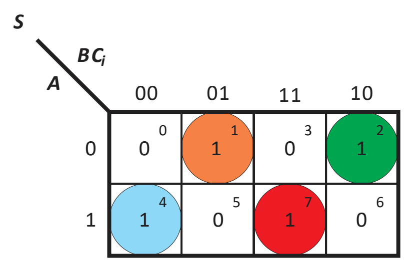
FIGURE 3.21.1 Binary Full-Adder

Addend A	Augend B	Carry-In C_i	Carry-Out C_o	Sum S
0	0	0	0	0
0	0	1	0	1
0	1	0	0	1
0	1	1	1	0
1	0	0	0	1
1	0	1	1	0
1	1	0	1	0
1	1	1	1	1

FIGURE 3.21 (a) Truth Table for a Full-Adder



$$C_o = AB + AC_i + BC_i$$



$$S = A'B'C_i + A'BC_i' + ABC_i + AB'C_i'$$
$$S = A'B'C_i + ABC_i + A'BC_i' + AB'C_i'$$
$$S = (A'B' + AB)C_i + (A'B + AB')C_i'$$
$$S = (\overline{A \oplus B})C_i + (A \oplus B)C_i'$$
Let $Z = A \oplus B$
$$S = Z'C_i + ZC_i'$$
$$S = Z \oplus C_i$$
$$S = A \oplus B \oplus C_i$$

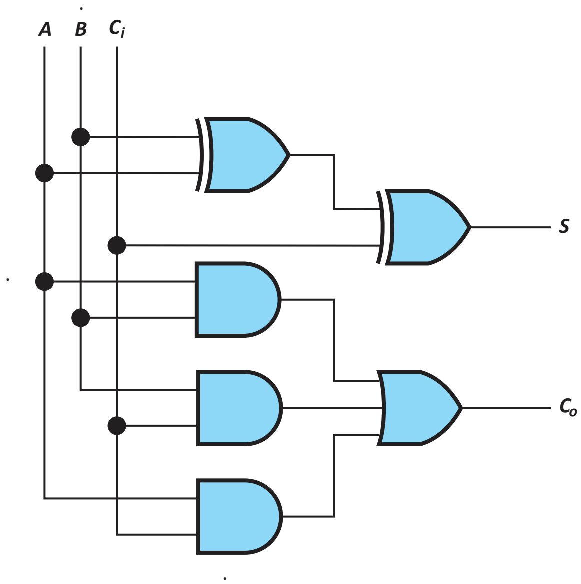
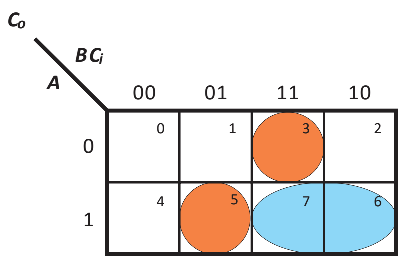


FIGURE 3.21.2 Binary Full-Adder Logic Diagram



$$C_o = AB + AC_i + BC_i$$
$$C_o = AB + (A \oplus B)C_i$$

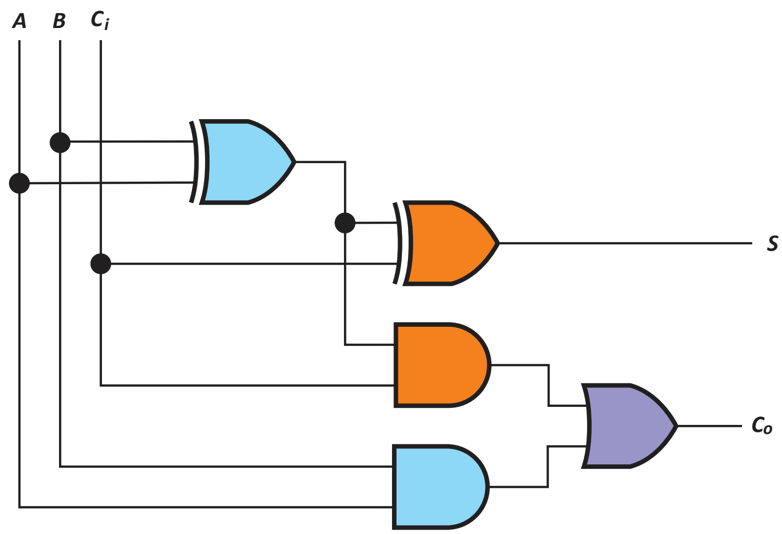


FIGURE 3.21 (b) Logic Diagram for a Full Adder Constructed from two Half-Adders