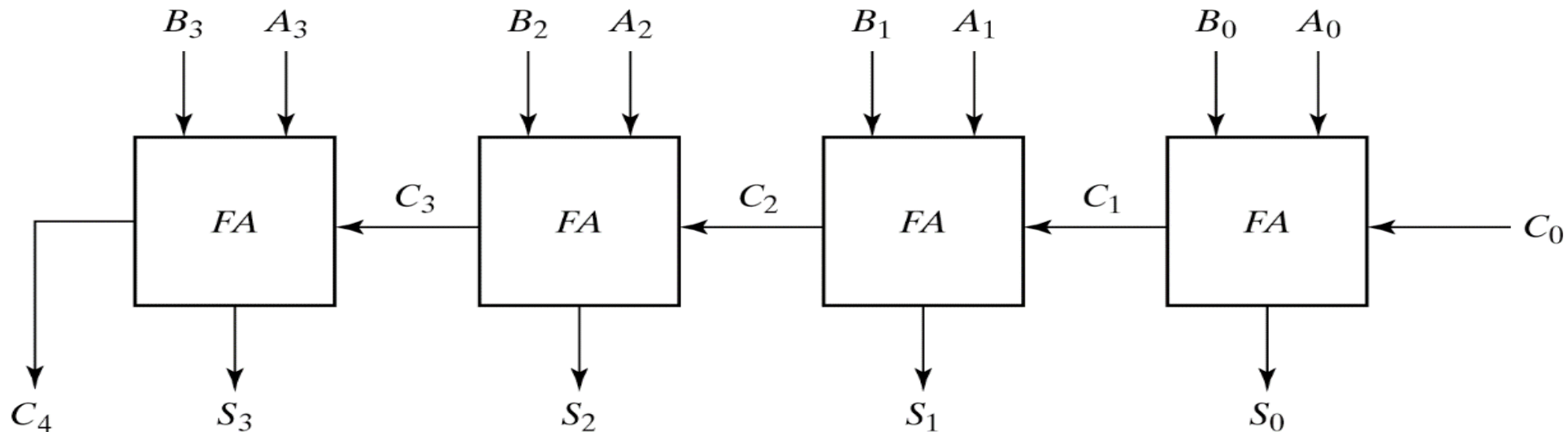


Binary Adder/Subtractor

4-bit Binary Adder

This is also called **Ripple Carry Adder**, because of the construction with full adders are connected in cascade.

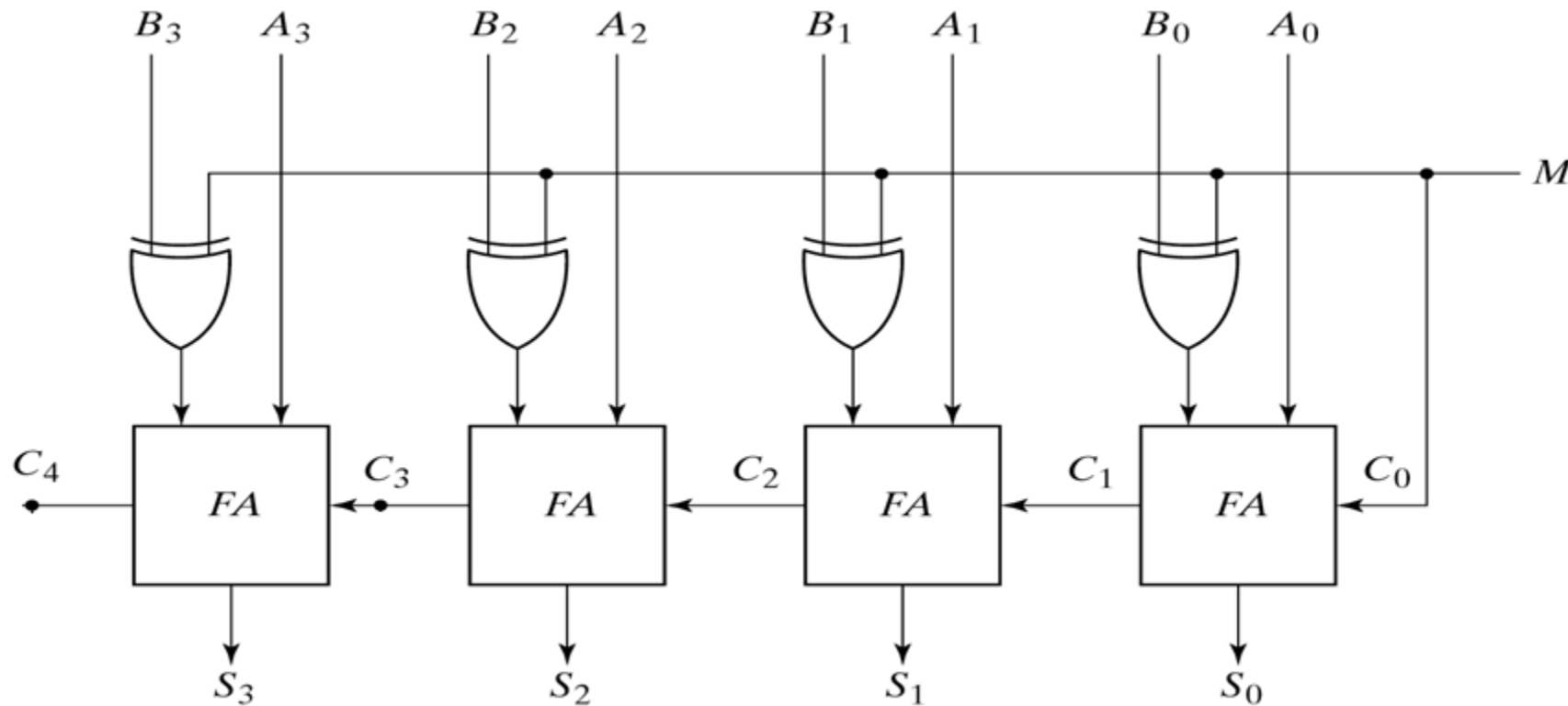
Subscript i :	3	2	1	0	
Input carry	0	1	1	0	C_i
Augend	1	0	1	1	A_i
Addend	0	0	1	1	B_i
Sum	1	1	1	0	S_i
Output carry	0	0	1	1	C_{i+1}



4-bit Binary Adder

4-bit Binary Adder-Subtractor

$M = 1 \rightarrow$ subtractor ; $M = 0 \rightarrow$ adder



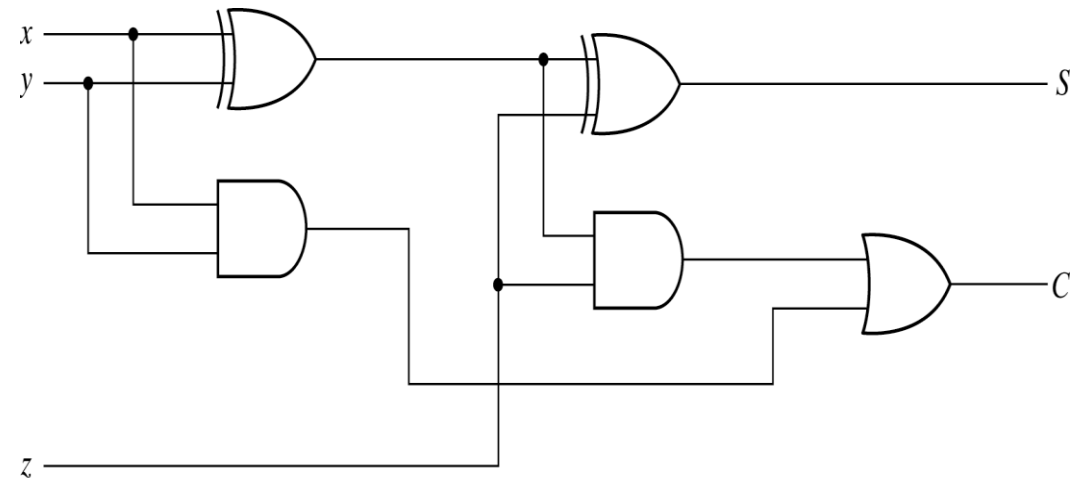
Full Adder

Combinational circuit that performs the **addition of three bits** (two significant bits and a previous carry) is a **full adder**.

The truth table for the full adder is listed below:

x	y	z	C	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

$$\begin{aligned}
 S &= x'y'z + x'yz' + xy'z' + xyz \\
 &= x \oplus y \oplus z = (x \oplus y) \oplus z \\
 C &= x'yz + xy'z + xyz' + xyz \\
 &= z(x'y + xy') + xy(z' + z) \\
 &= (x \oplus y)z + xy
 \end{aligned}$$



Implementation of full adder

Thank You