Full Adder

The diagram (Figure 1), shows a half adder built with AND and XOR gates. The half adder has two outputs. This is because the addition of the binary bits at A and B will result in a sum but there may also be a carry. However, the half adder does not support a carry in. To remedy this, two half adders can be combined to form a full adder (Figure 1). The second half adder combines the sum output from the first with a carry in bit. An OR gate provides the carry out bit. The truth table (Table 1) shows the possible inputs and the resulting outputs. The full adder can be used for the addition of multibit binary numbers. Full adders can be connected together to perform 8-bit, 16-bit or 32 bit addition.

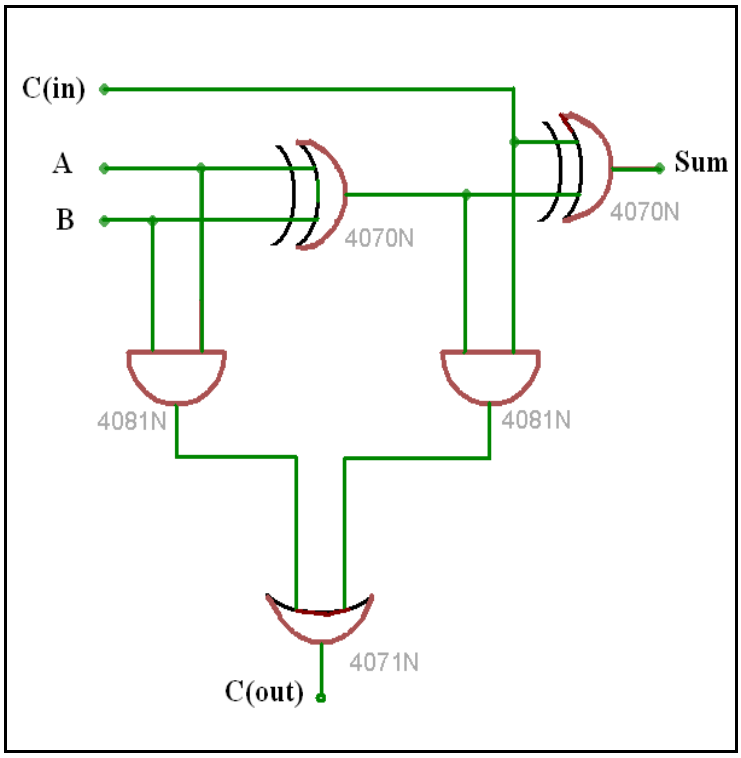

Figure 1. A full adder supports a carry in bit (Cin), as well as a carry out bit (Cout)

C(in) Carry in
A Binary digit input
B Binary digit input
Sum Sum
C(out) Carry (out)

C(in)	A	B	C(out)	Sum
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

Table 1. Truth table for the half adder