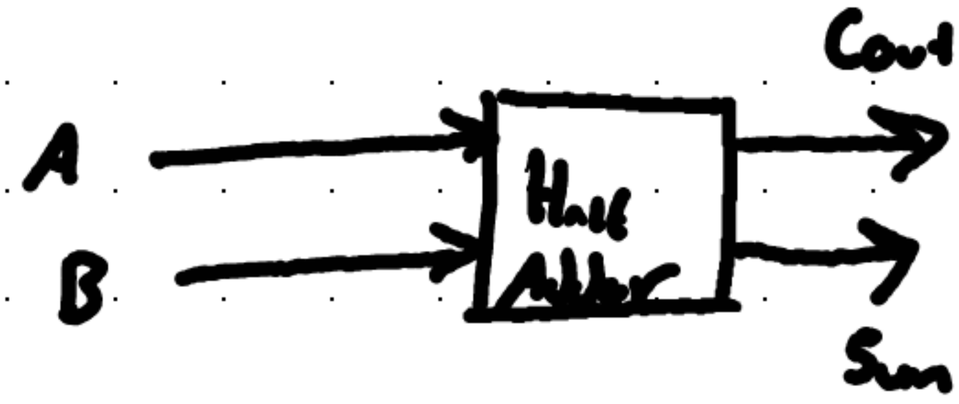
Digital Circuits 1: ECED 2200 Lecture 4

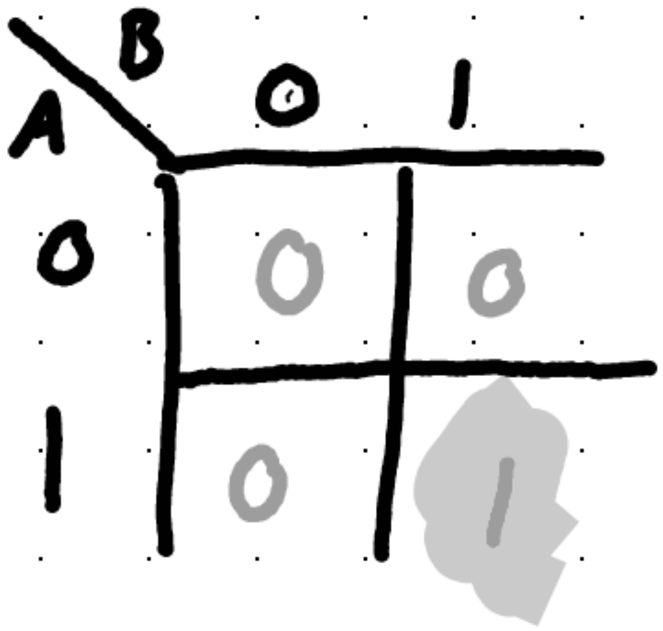
Half Adder

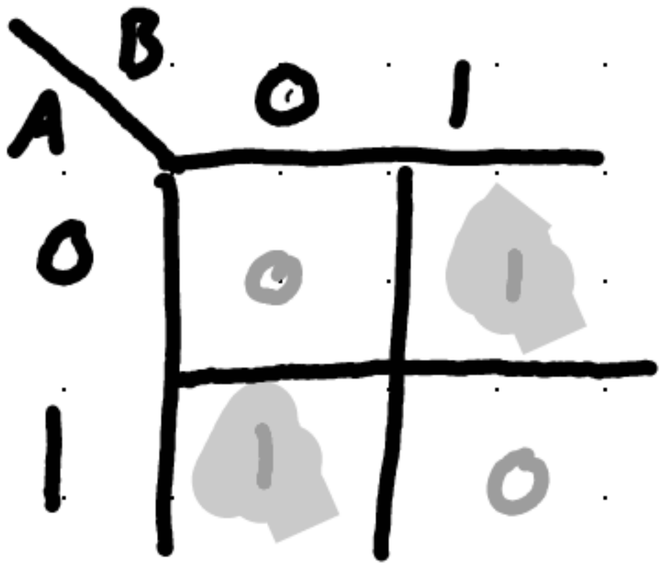


A	B	Carry Cout	Sum
0	0	0	0
0	1	0	1
1	0	0	1
1	1	1	0

(Number) 0 1 1 2

K-Maps for Cout and Sum





$Cout = A \cdot B$

XOR More Efficient!

$Sum = \bar{A} \cdot B + A \cdot \bar{B}$

$= A \oplus B$

Number Systems

Bit = 1 Bit

Nibble = 4 Bits

Byte = 8 Bits

Decimal to Binary Conversion

0.625

$$\begin{array}{r} \times \quad 2 \\ \hline \cancel{1}.250 \\ \times \quad 2 \\ \hline 0.5 \\ \times \; 2 \\ \hline 1.0 \end{array}$$

(1) 0 (1)

MSB

LSB

0.101

Signed Bits

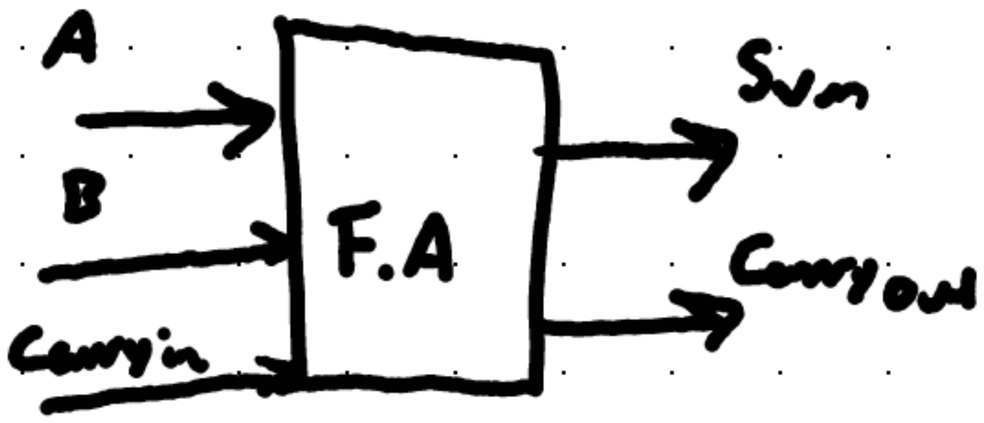
True Signed magnitude is applied to binary numbers by using an extra bit position to represent the sign.

-0 is defined here. This makes it easier to compute, but -0 is defined.

1000

The Complement number system is similar, but -0 is not defined. The easiest way to solve for negative Complement numbers is to flip the bits, and add one.

Full Adder



A	B	C_{in}	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