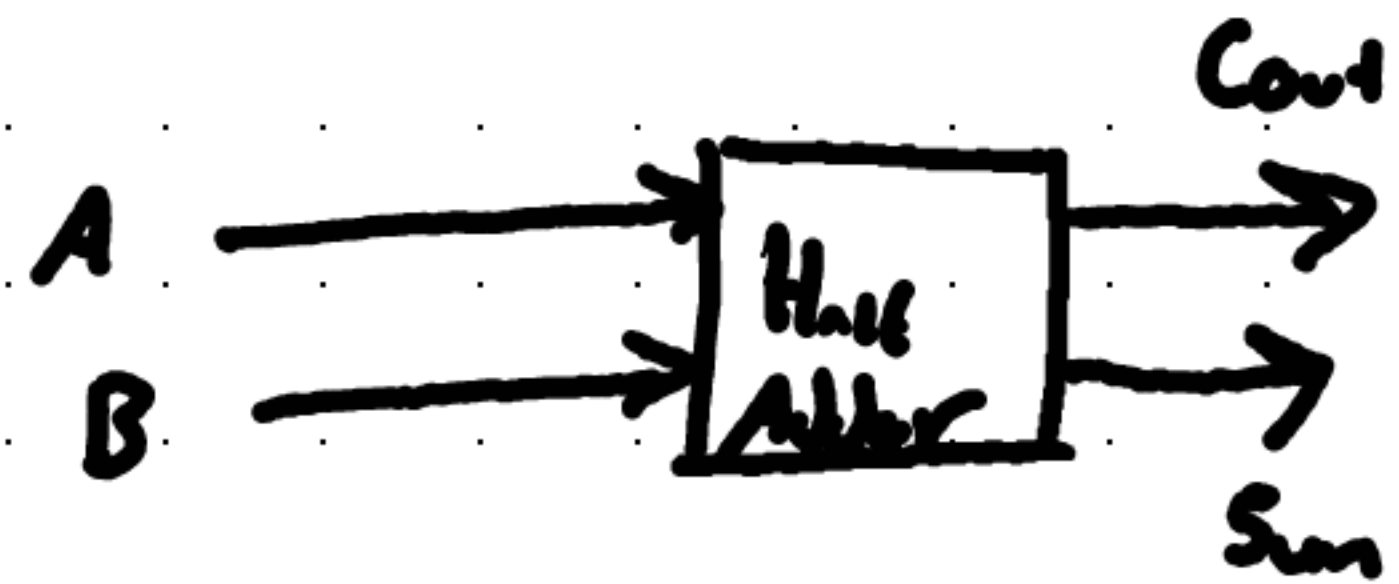


### Half Adder



A	B	Carry	Sum	(number)
0	0	0	0	0
0	1	0	1	1
1	0	0	1	1
1	1	1	0	2

### K-Maps for Carry and Sum

A \ B	0	1
0	0	0
1	0	1

A \ B	0	1
0	0	1
1	1	0

$$\text{Carry} = A \cdot B$$

XOR  
More  
Efficient!

$$\begin{aligned} \text{Sum} &= \bar{A} \cdot B + A \cdot \bar{B} \\ &= A \oplus B \end{aligned}$$

# Number Systems

Bit = 1 Bit

Nibble = 4 Bits

Byte = 8 Bits

## Decimal to Binary Conversion

$$\begin{array}{r} 0.625 \\ \times 2 \\ \hline 1.250 \\ \times 2 \\ \hline 0.5 \\ \times 2 \\ \hline 1.0 \end{array}$$

(1)

0

(1)

MSB

LSB

0.101

# Signed Bits

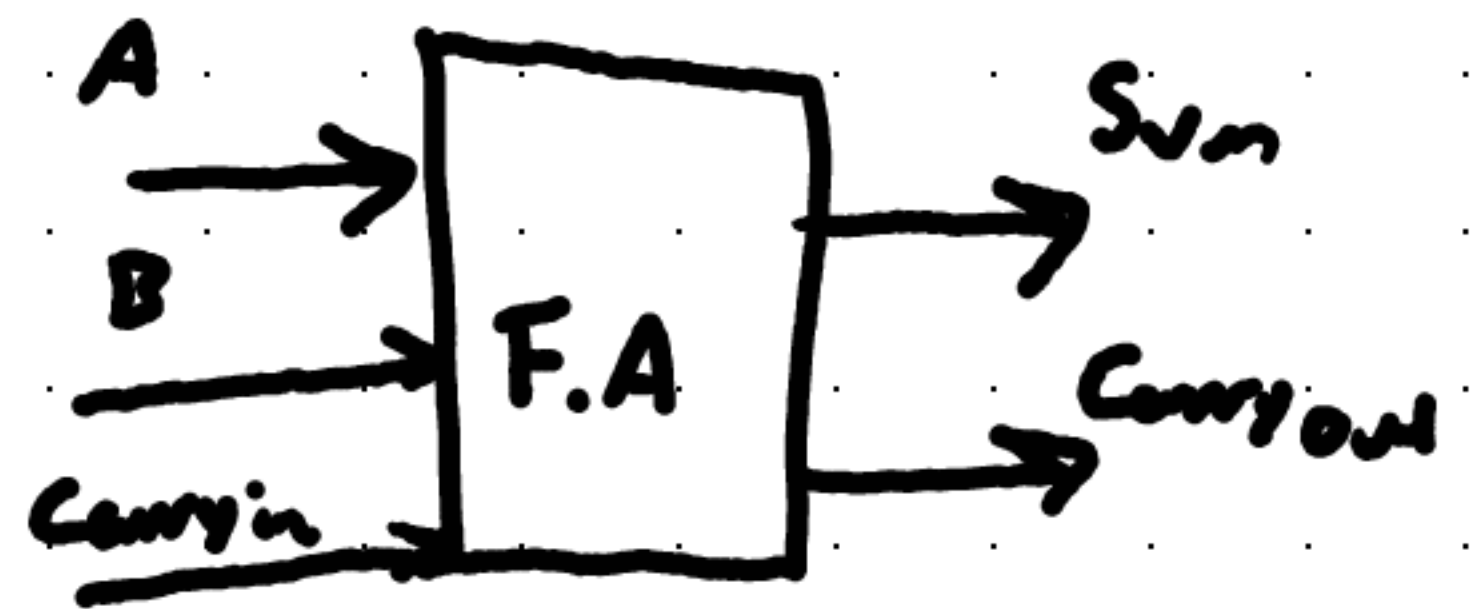
The Signed Magnitude is applied to binary numbers by using an extra bit position to represent the sign.

-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 <sub>in</sub>	C <sub>out</sub>	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