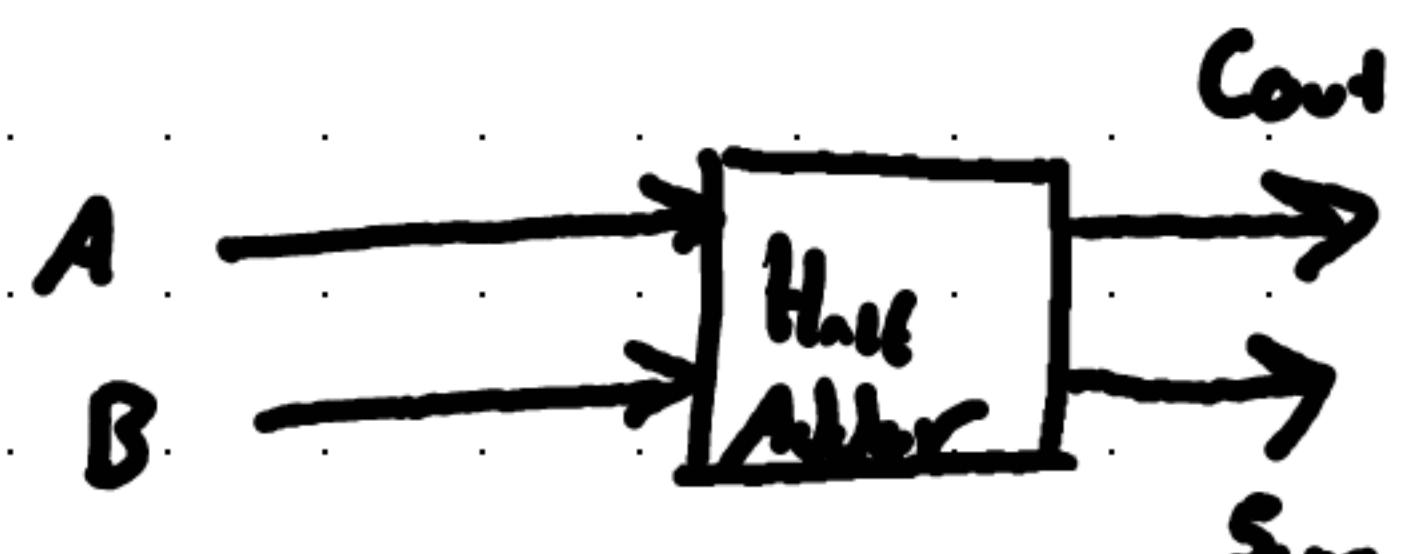


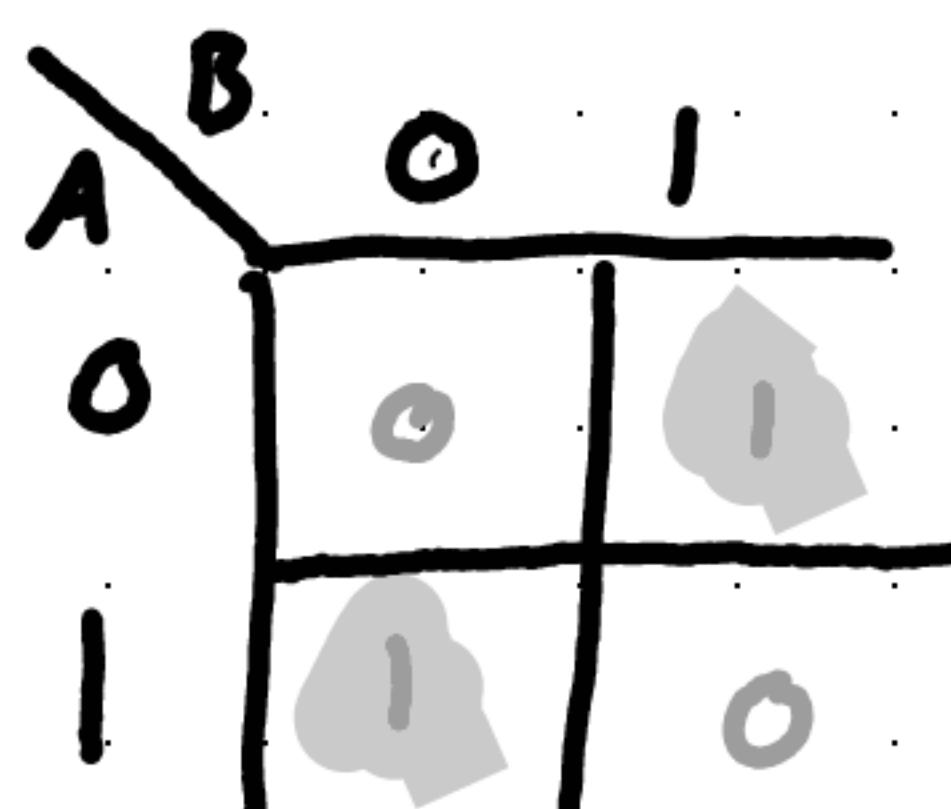
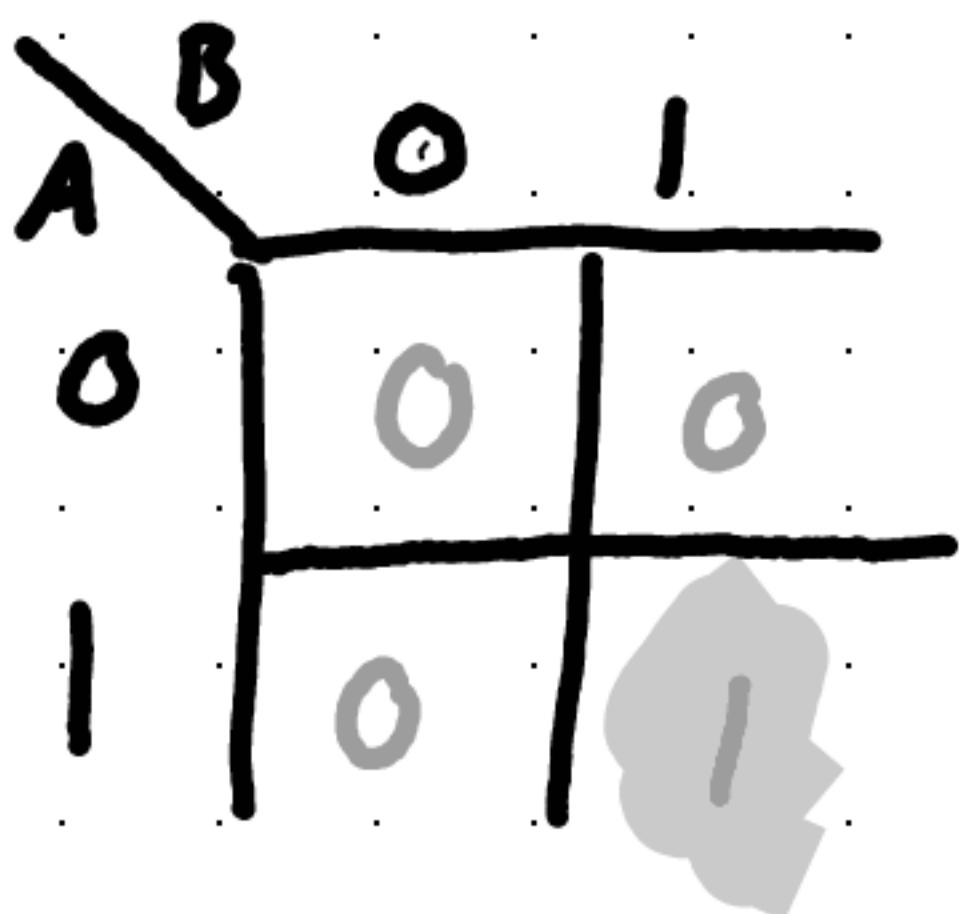
Digital Circuits 1: ECE 2200 Lecture 4

Half Adder



A	B	Cout (Carry)	Sum (Number)
0	0	0	0
0	1	0	1
1	0	0	1
1	1	1	0

K-Maps for Cout and Sum



$$Cout = A \cdot B$$

XOR
Move
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

0.625

$\times 2$

~~0~~.250

$\times 2$

0.5

$\times 2$

1.0

0.101

①

0

①

MSB

LSB

Signed Bits

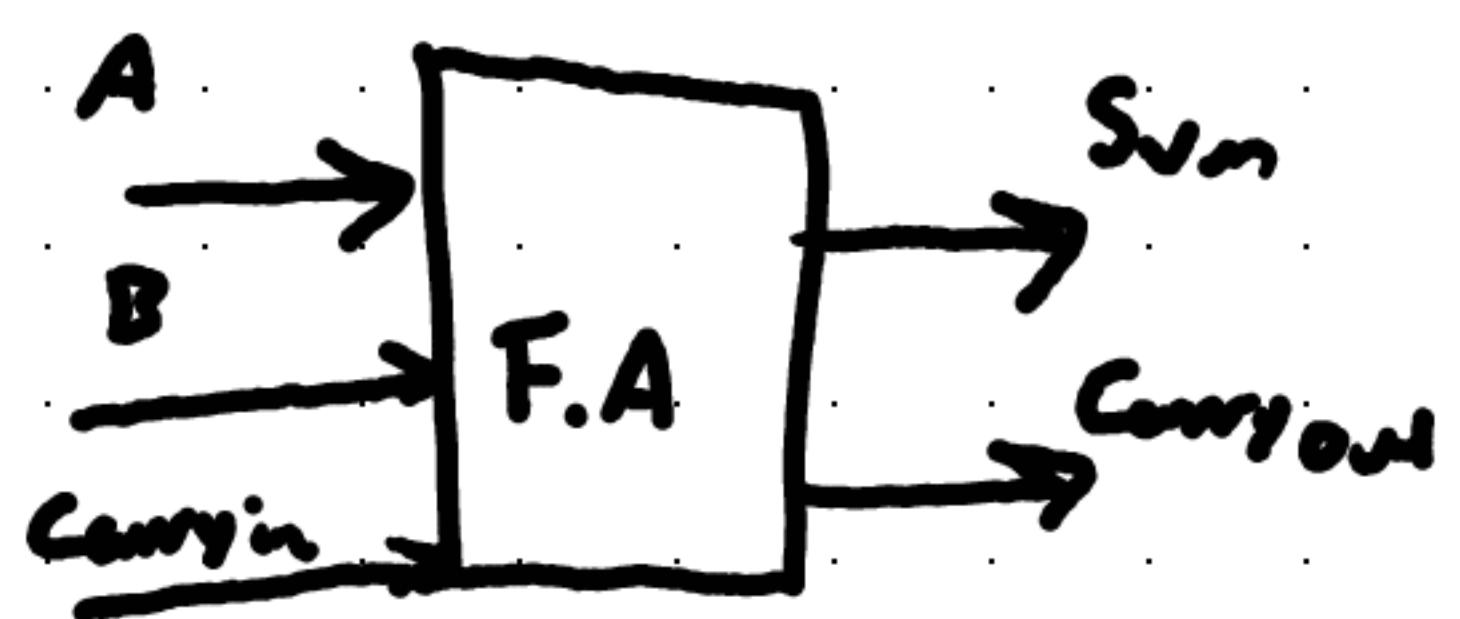
The Signed Magnitude is applied to binary numbers by using an extra bit position to represent the sign.

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

1000

The Complement Number System is slower, 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	Cin	Cout	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