

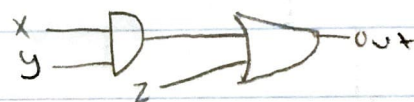
CIS-310 HW1

Truth table for 3-input AND Gate:

1.1.)

X	Y	Z	Output
0	0	0	0
0	0	1	0
0	1	0	0
0	1	1	0
1	0	0	0
1	0	1	0
1	1	0	0
1	1	1	1

Truth table of AND \rightarrow OR Gate



X	Y	Z	Output
0	0	0	0
0	0	1	1
0	1	0	0
0	1	1	1
1	0	0	0
1	0	1	1
1	1	0	1
1	1	1	1

1.2.) Non $A=1$ $B=0$ $C=1$ $D=1$

Output = 1

Do

$$2.1) (A + A \cdot B) = A$$

$$(A \cdot (B+C) + 0 \cdot C) = AB + AC + BC$$

$$2.2) (A \cdot (B+C) + B \cdot C)$$

A	B	C	Out
0	0	0	0
0	0	1	0
0	1	0	0
0	1	1	1
1	0	0	0
1	0	1	1
1	1	0	1
1	1	1	1

==

$$AB + AC + BC$$

A	B	C	Out
0	0	0	0
0	0	1	0
0	1	0	0
0	1	1	1
1	0	0	0
1	0	1	1
1	1	0	1
1	1	1	1

3.1)

AB \ C D	00	01	11	10
00	0	1	x	1
01	x	0	x	x
11	x	x	1	x
10	x	x	x	x

3.2)

$$X = \overline{B} \cdot D + C$$

Part 4.)

P₀: A₀B₀

A ₀ B ₀	00	01	11	10
00	0	0	0	0
01	0	1	1	0
11	0	1	1	0
10	0	0	0	0

$$P_0 = A_0 B_0$$

P₁: A₁B₀

A ₁ B ₀	00	01	11	10
00	0	0	0	0
01	0	0	1	1
11	0	1	0	1
10	0	1	1	0

$$P_1 = \bar{A}_1 A_0 B_1 + A_0 B_1 \bar{B}_0 + A_1 \bar{B}_1 B_0 + A_1 \bar{A}_0 B_0$$

P₂: A₁B₁

A ₁ B ₁	00	01	11	10
00	0	0	0	0
01	0	0	0	0
11	0	0	0	1
10	0	0	1	1

$$P_2 = A_1 \bar{A}_0 B_1 + A_1 B_1 \bar{B}_0$$

P₃: A₁B₀

A ₁ B ₀	00	01	11	10
00	0	0	0	0
01	0	0	0	0
11	0	0	1	0
10	0	0	0	0

$$P_3 = A_1 A_0 B_1 B_0$$

4.2)

Full Adder

A	B	out	carry
0	0	0	0
0	1	1	0
1	0	1	0
1	1	0	1

Out: A B

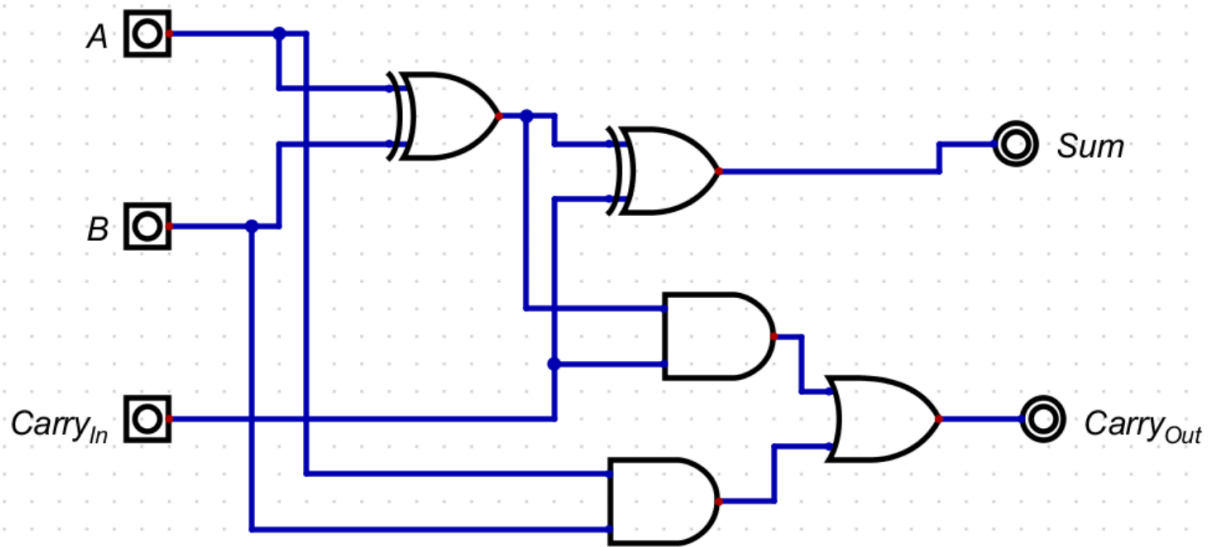
A	B	out
0	0	1
1	1	0

Carry: A B

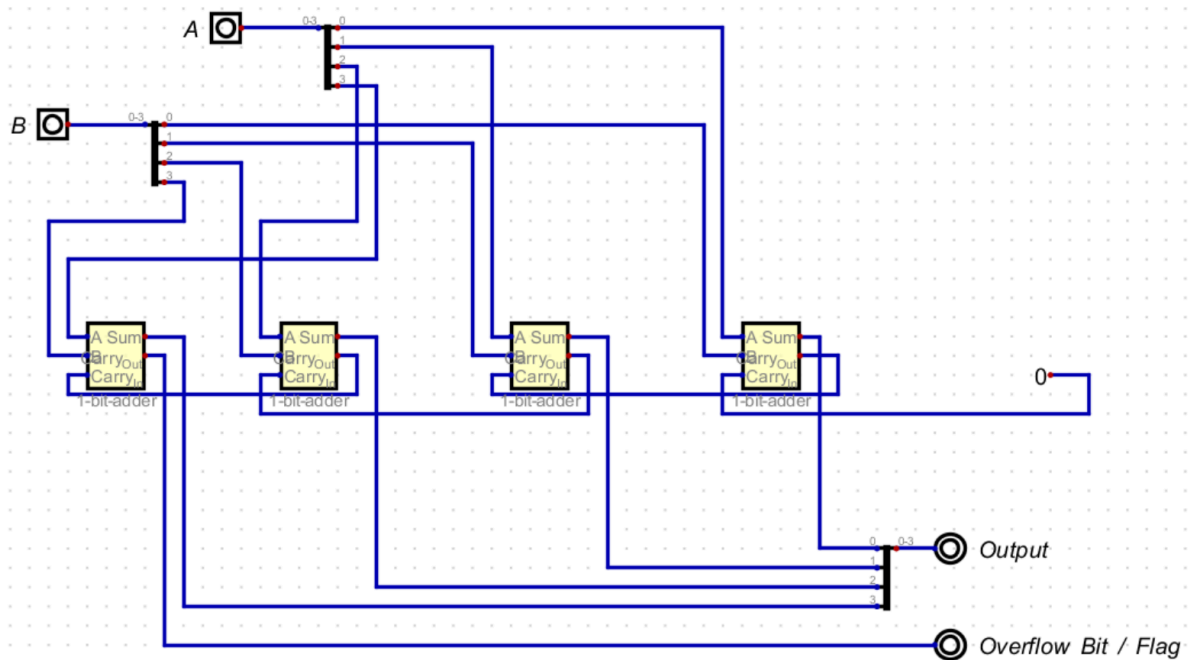
A	B	carry
0	0	0
1	0	1

$$\text{out} = \bar{A} B + A \bar{B} \quad \text{carry} = AB$$

One-Bit Adder



4-Bit Adder



4-Bit Adder Test cases:

