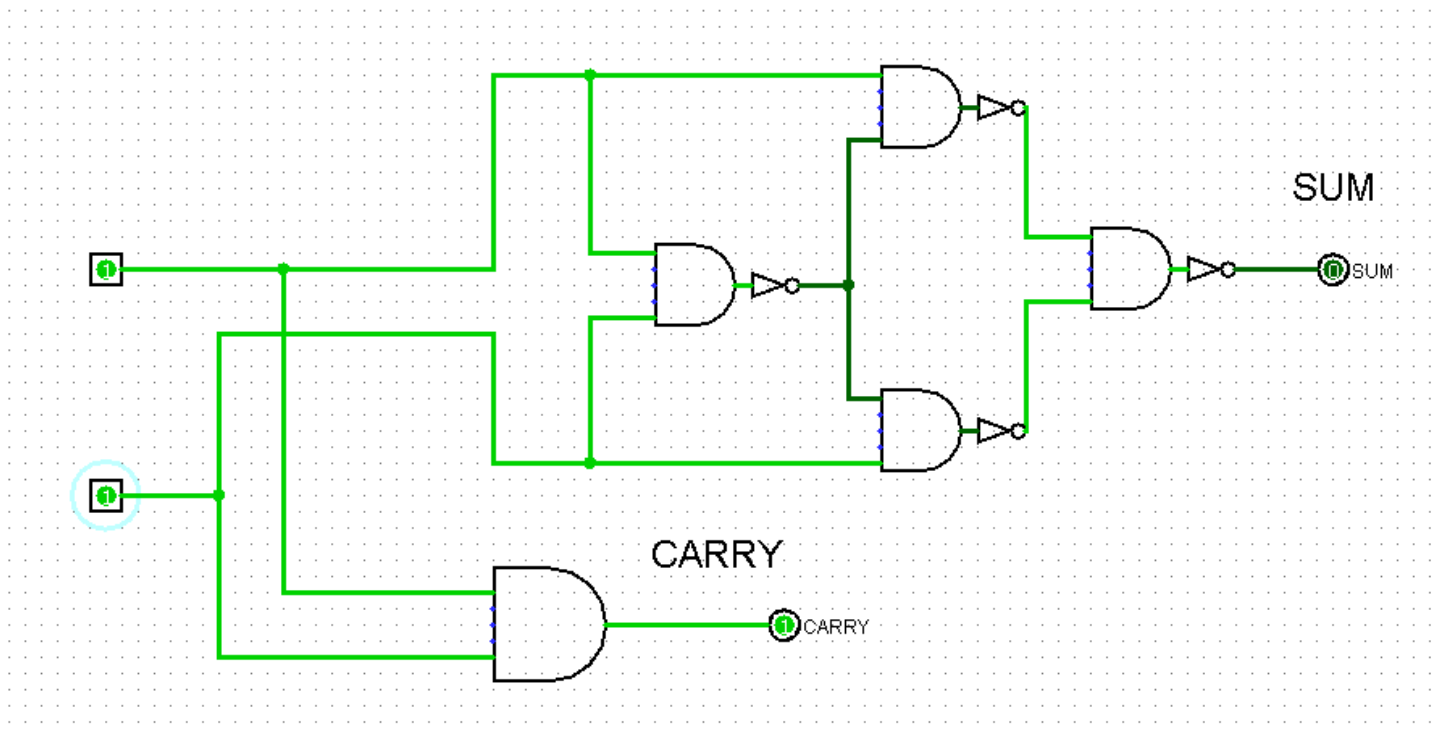# ASSIGNMENT 3: LOGISIM
U19CS012

Use Logisim software to create and store the followings circuits for further usage: (For Practice)

1. 1-bit Half Adder

Build a 1-bit half adder. This takes two input wires, x0 and x1, and generates two output wires, s for the sum and c for the carry.

Circuit Image:

Truth Table:

a	b	SUM	CARRY
0	0	0	0
0	1	1	0
1	0	1	0
1	1	0	1

2. 1-bit Full Adder

The half-adder from the previous exercise can't be composed to make larger adders because it doesn't take a carry input, which is necessary if we're to chain then. Build a 1-bit full adder which takes c_in, x0, and x1 as inputs, and generates s and c. (Note that we don't need any additional outputs here.)
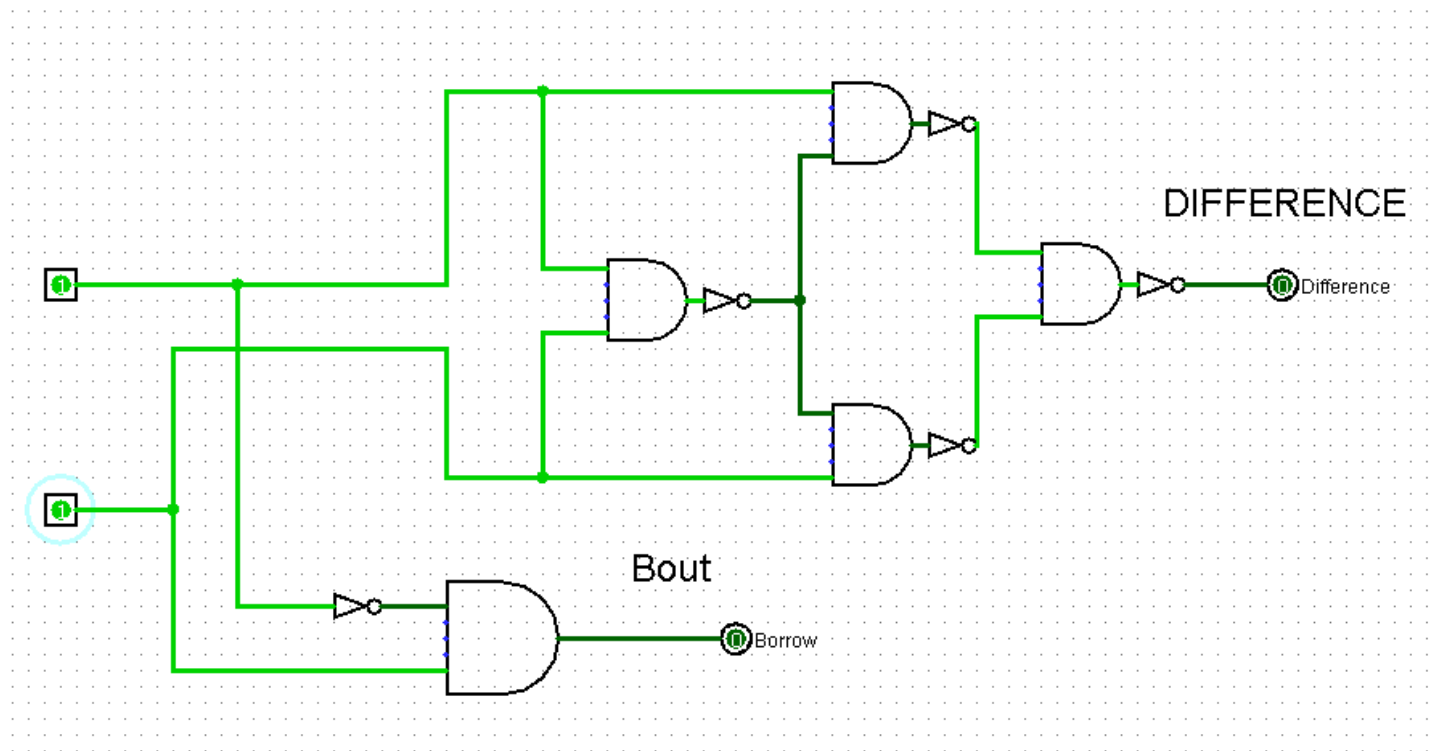
Circuit Image:
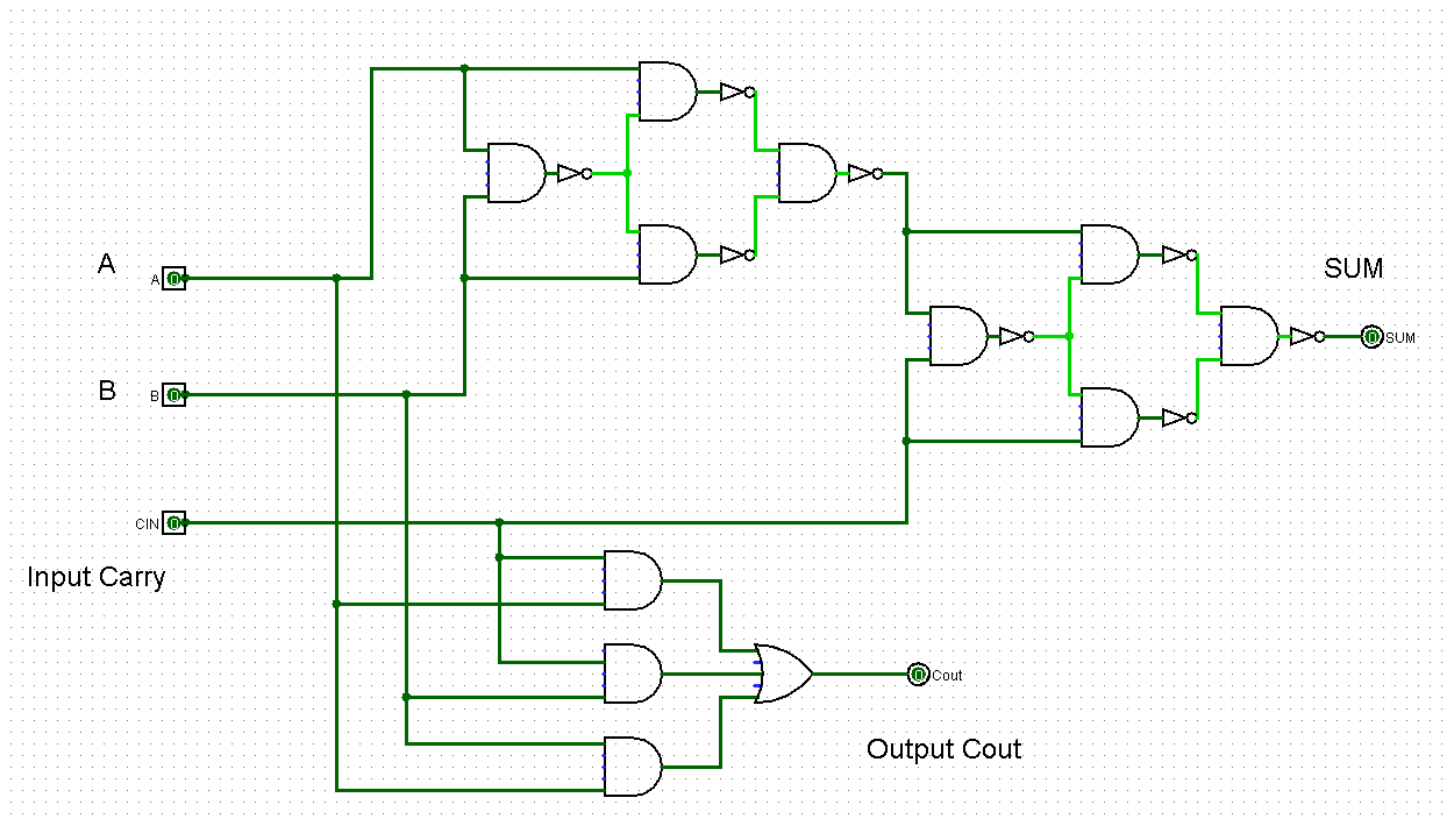
Truth Table:

A	B	CIN	SUM	Cout
0	0	0	0	0
0	0	1	1	0
0	1	0	1	0
0	1	1	0	1
1	0	0	1	0
1	0	1	0	1
1	1	0	0	1
1	1	1	1	1

3. 1-bit Half Subtractor

Build a 1-bit half subtractor. This takes two input wires, $x0$ and $x1$, and generates two output wires, D for the difference and c for the borrow.
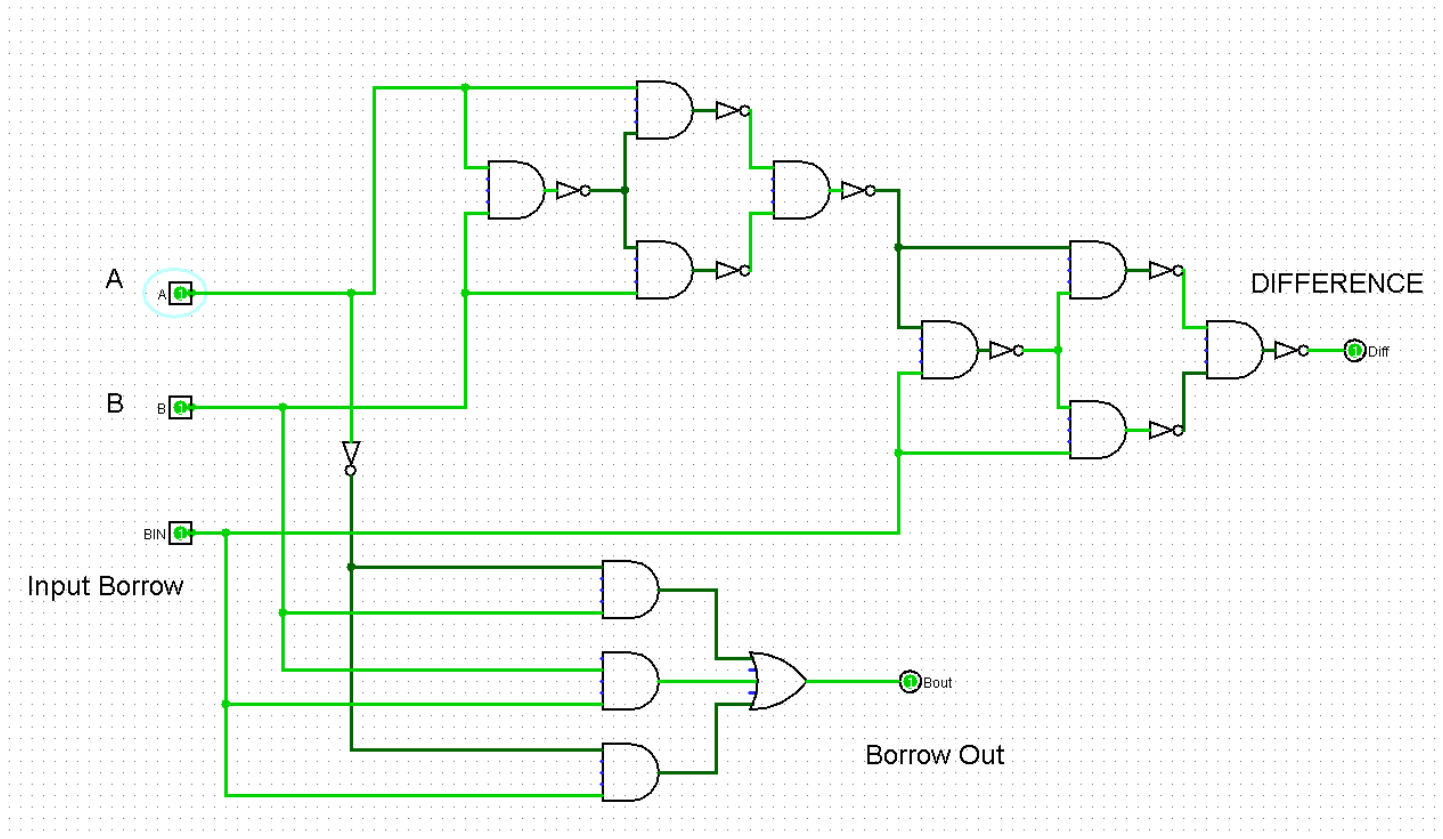
Circuit Image:

DIFFERENCE

Difference

Bout

Borrow

Truth Table:

a	b	Difference	Borrow
0	0	0	0
0	1	1	1
1	0	1	0
1	1	0	0

4. 1-bit Full Subtractor

Build a 1-bit full subtractor which takes c_in(Borrow), x0, and x1 as inputs, and generates D(Difference) and c(Borrow).

Circuit Image:

A

B

BIN

Input Borrow

DIFFERENCE

Diff

Bout

Borrow Out

Truth Table:

A	B	BIN	Diff	Bout
0	0	0	0	0
0	0	1	1	1
0	1	0	1	1
0	1	1	0	1
1	0	0	1	0
1	0	1	0	0
1	1	0	0	0
1	1	1	1	1

Submitted By:
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