Ch 3.2 Adding!

NOTE10: Flushing out binary addition in detail

Text reference: ***Section 3.2***

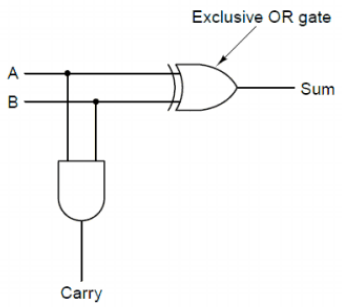
Remember our 2's complement… binary addition means we can also do subtraction

Binary addition - 4 cases for adding two bits:

A + B ---- SUM	0 + 0 ---- 0	0 + 1 ---- 1	1 + 0 ---- 1	1 + 1 ---- 0 ~> carry the 1

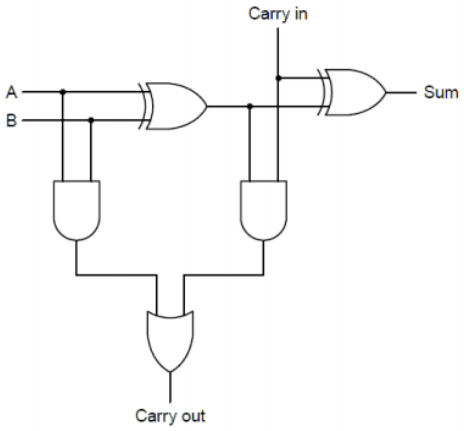
Half adder - add two bits, truth table, SUM = XOR

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

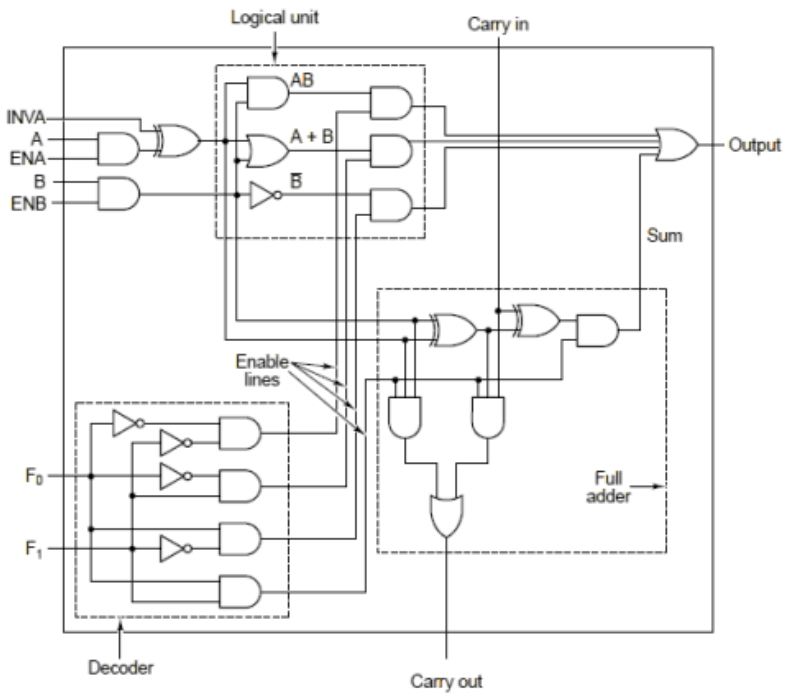


Full adder - add two bits with carry-in, now 8 row truth table, 2 half adders and OR gate

A	B	Carry in	Sum	Carry out
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



ALU from page 167 - this is a 1-bit slice of an ALU



Boolean and arithmetic operations, controlled by inputs F0, F1

F1	F0	Operation
0	0	And = AB
0	1	Or = A+B
1	0	Invert = B'
1	1	Add = A add B

Enables (ENA, ENB) and invert (INVA) operations happen first!

8 slices rippled together create an 8-bit ALU