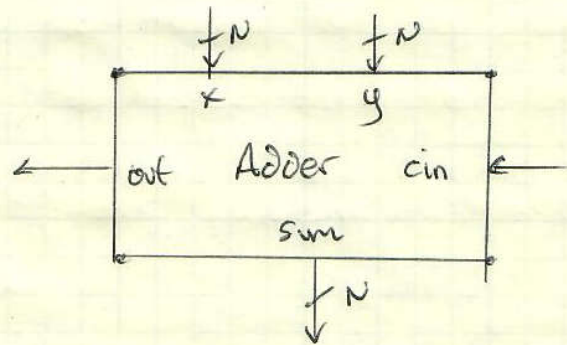
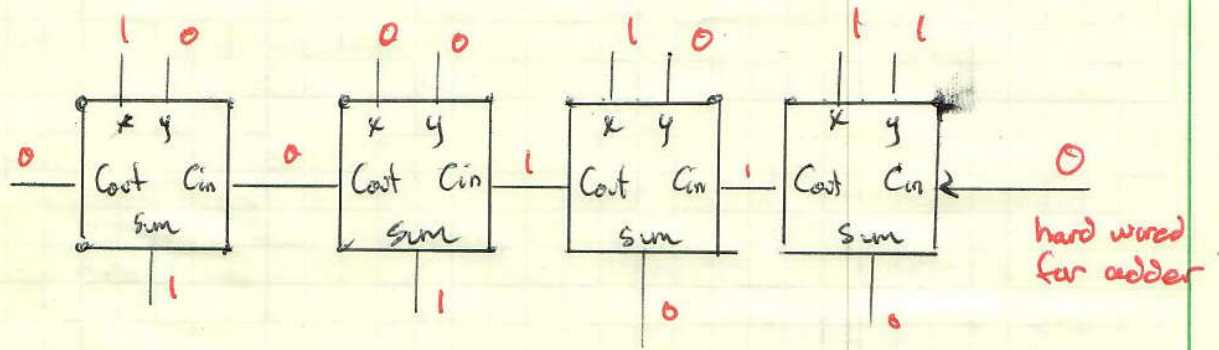


4-bit adder architecture = ripple carry adder



N-bit Adder

Data input : 2 N-bit vectors x & y

Data output : N-bit vector sum

Control : None

Status : 1-bit out

Behavior : $sum = x + y$

$out = 1$ when $x + y$ generates overflow

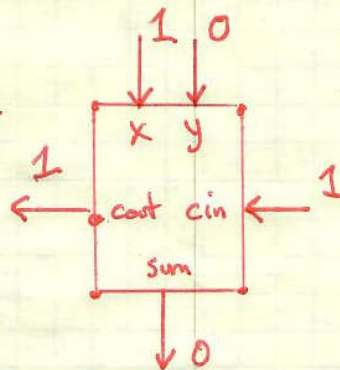
Problem - for modest N , the truth table gets too large. Ex $N=8 \Rightarrow 64k$ rows in truth table

Solution - break problem into parts / bit slices

Ex

$$\begin{array}{r} 1011 \\ + 0001 \\ \hline 1100 \end{array}$$

Full Adder \Rightarrow



	x	y	cin	cout	sum
	0	0	0	0	0
3	0	0	1	0	1
	0	1	0	0	1
	0	1	1	1	0
4	1	0	0	0	1
2	1	0	1	1	0
10	1	1	0	1	0
	1	1	1	1	1

x \ y cin	00	01	11	10
0		1		1
1	1		1	

$$sum = x \oplus y \oplus cin$$

x \ y cin	00	01	11	10
0			1	
1		1	1	1

$$cout = x cin + xy + y cin$$