EECS150 - Digital Design

Lecture 11 - Combinational Logic Circuits

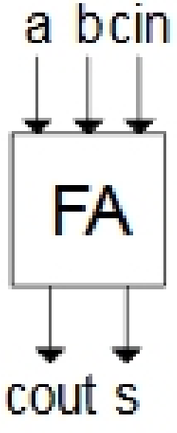
Part 1 - Adders

October 1, 2002

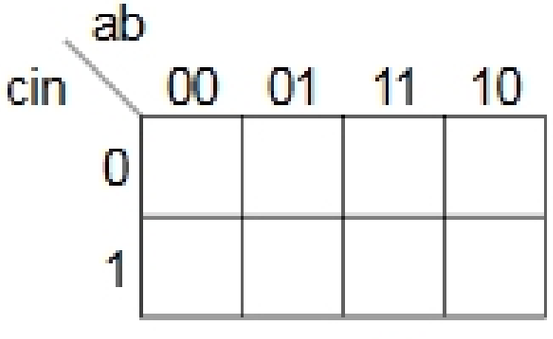
John Wawrzynek

Adders

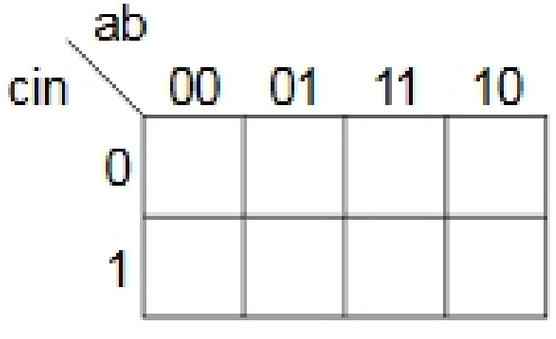
Full-adder cell (FA) revisited:



a	b	cin	cout	s
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

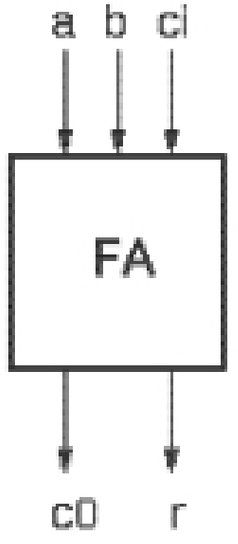


cout



s

Carry-ripple Adder



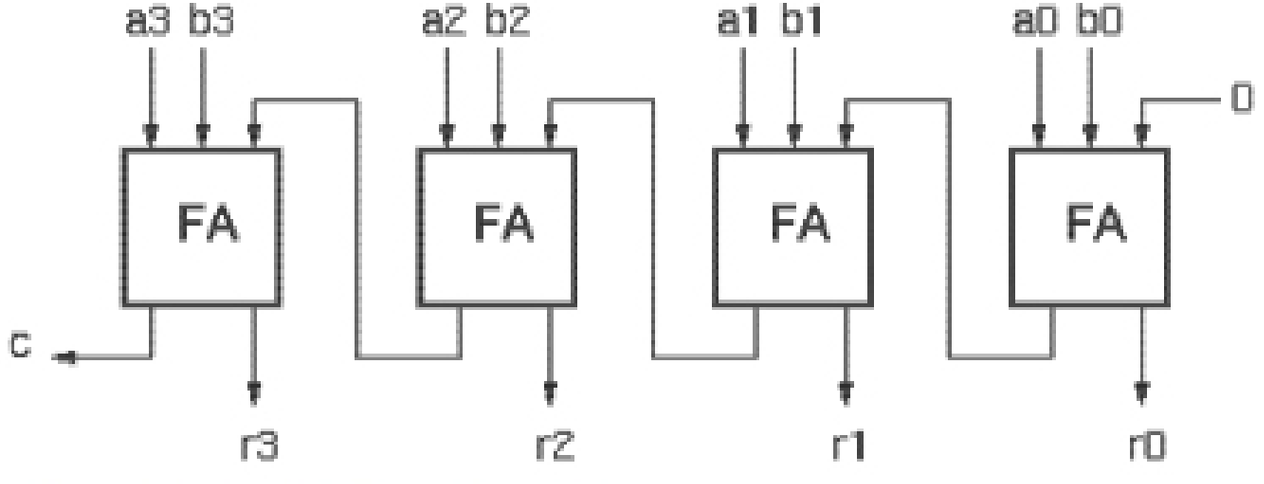
"Full adder cell"

- Each cell:

  $r_i = a_i \text{ XOR } b_i \text{ XOR } c_{in}$

  $c_{out} = a_i c_{in} + a_i b_i + b_i c_{in} = c_{in}(a_i + b_i) + a_i b_i$

- 4-bit adder:



- What about subtraction?