Boolsk algebra

3 inputs = $2^3 = 8$

tirsdag 24. januar 2017 10.07

010100

AND '·' $x \cdot y$

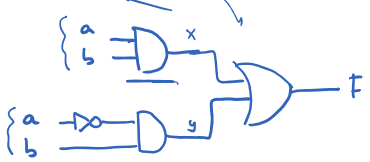
OR '+' $x + y$

NOT '-' '' $\bar{x}$ x'

x	y	AND	OR
0	0	0	0
1	0	0	1
2	1	0	1
3	1	1	1

x	NOT
0	1
1	0

$F = ab + a'b \Rightarrow b(a + a')$, $a + a' = 1$



a	b	x	y	F
0	0	0	0	0
→ 0	1	0	1	1
1	0	0	0	0
1	1	1	0	1

b —— F

$F = b$

a	$\bar{a}$	OR
0	1	1
1	0	1

$b \cdot 1 = b$

b	1
0	0
1	1

DeMorgans theorem

$(x \cdot y)' = x' + y'$

$(x + y)' = x' \cdot y'$

$\overline{\overline{xy}} = xy$

$F = x'y'z + x'yz + xy'$ — sum av produkt

$F = x'z(y' + y) + xy'$

$F = x'z(1) + xy'$

$F = x'z + xy'$

$F = \sum(0, 1, 2, 5 \ldots)$

$F = S(\ldots)$

Produkt-av-sum

$\overline{(x + y)} = x' \cdot y'$

$F = (a + b + c)(a + b + c')(\ldots$

$F = \Pi(0, 1, \ldots)$

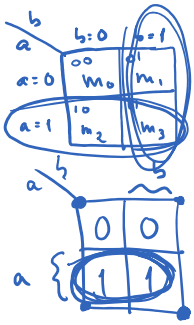
Min terms

	a	b	c	F
m_0	0	0	0	0
m_1	0	0	1	1
m_2	0	1	0	1
m_3	0	1	1	0
m_4	1	0	0	1
m_5	1	0	1	1
m_6	1	1	0	1
m_7	1	1	1	0

ab

$F = \Sigma(1, 2, 4, 5, 6)$

$F = a'b'c + a'bc' + ab'c' + ab'c + abc'$



	a	b	F
m_0 →	0	0	0 ←
	0	1	0 ←
	1	0	1 ←
	1	1	1 ←

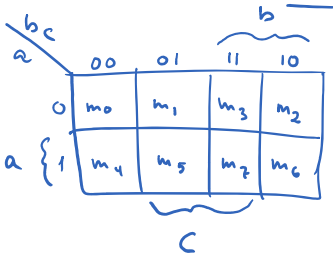
$F = ab' + ab$

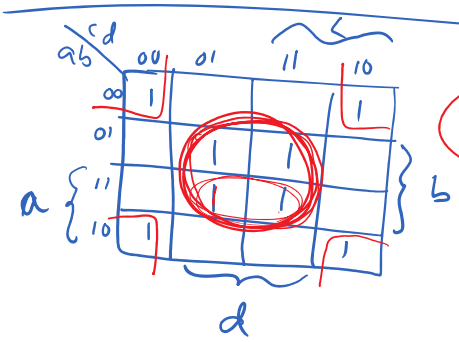
$= a(b' + b)$

$= 1$

$F = a$

$F = a$





$F = bd + b'd'$

$F = b \odot d$

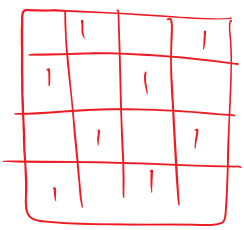
$b \odot d$

	b	d	F
→	0	0	1
	0	1	0
	1	0	0
→	1	1	1

XOR

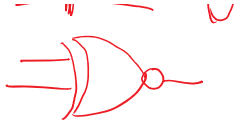
$\oplus$

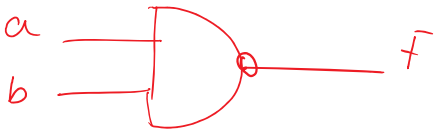
a	b	c	XOR
0	0	0	0
0	0	1	1
0	1	0	1
0	1	1	0
1	0	0	1
1	0	1	0
1	1	0	0
1	1	1	1



XNOR

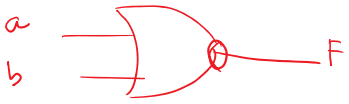
$\odot$





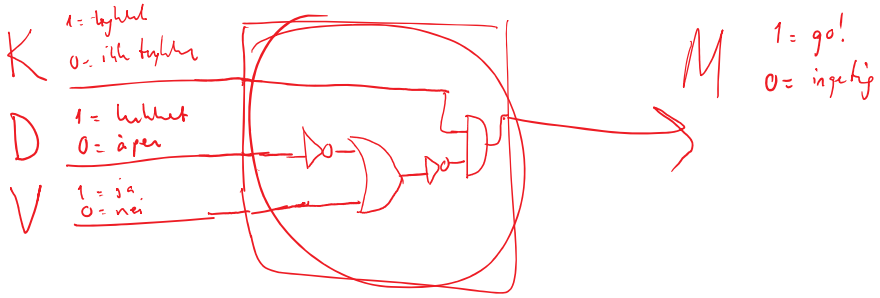
NAND

a	b	NAND
0	0	1
0	1	1
1	0	1
1	1	0



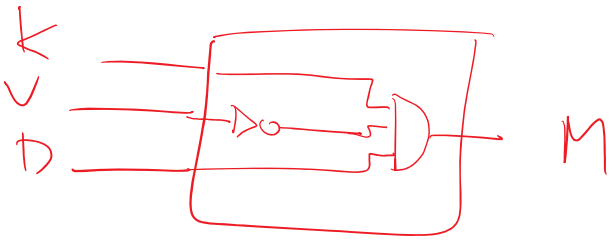
NOR

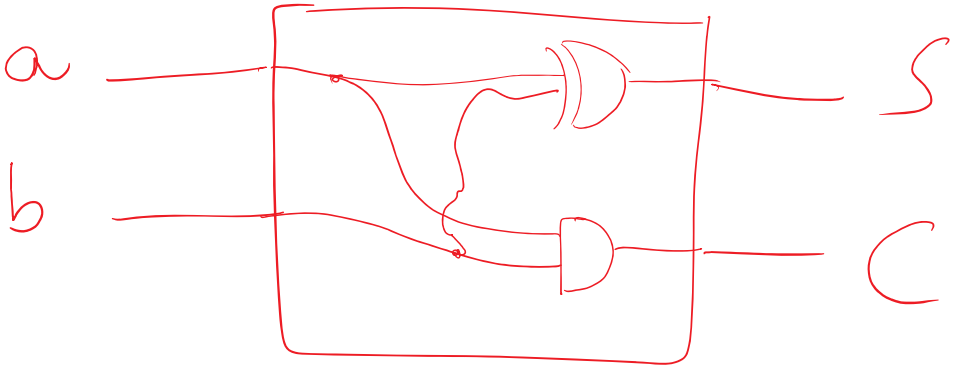
a	b	NOR
0	0	1
0	1	0
1	0	0
1	1	0



K V D	M
0 0 0	0
0 0 1	0
0 1 0	0
0 1 1	0
1 0 0	0
→ 1 0 1	1
1 1 0	0
1 1 1	0

KV'D



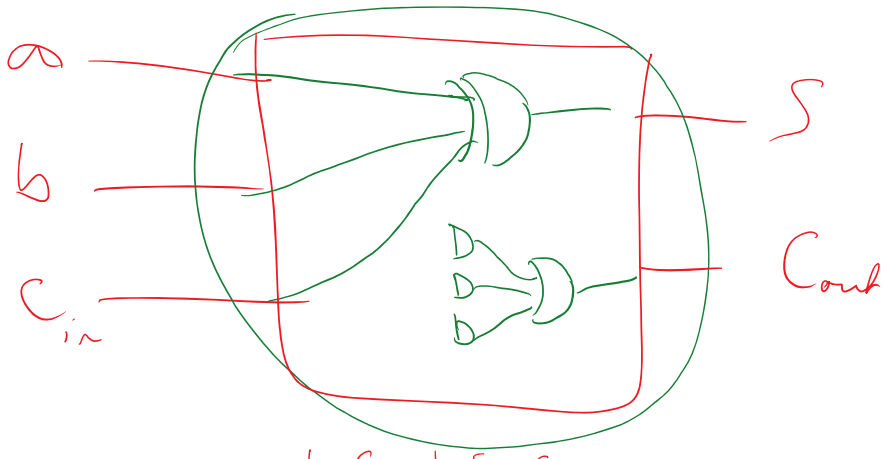


a	b	C	S
0	0	0	0
0	1	0	1
1	0	0	1
1	1	1	0

~~F=~~

$r = ab$

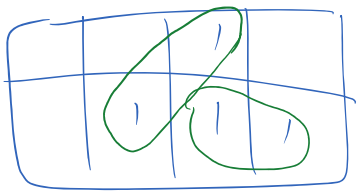
$S = a'b + ab' = a \oplus b$

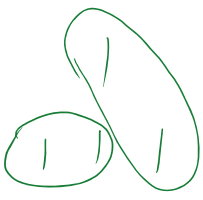


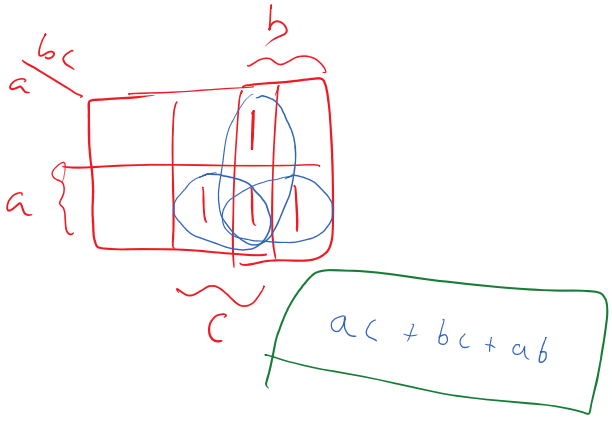
a	b	C_{in}	S	C_{out}
0	0	0	0	0
0	0	1	1	0
0	1	0	1	0
0	1	1	0	1
1	0	0	1	0
1	0	1	0	1
1	1	0	0	1
1	1	1	1	1

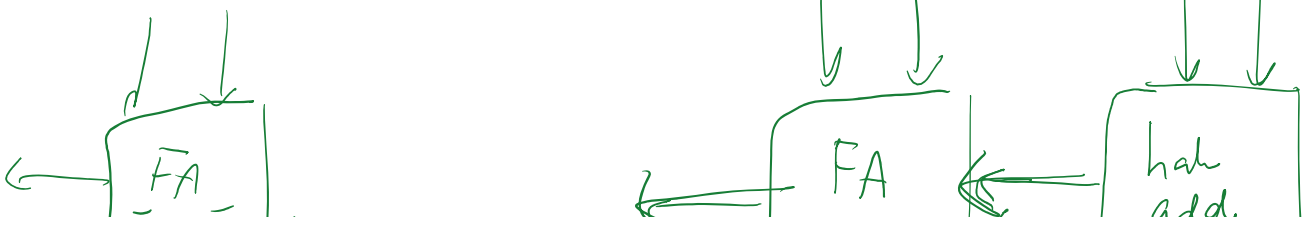
$S = a \oplus b \oplus c$

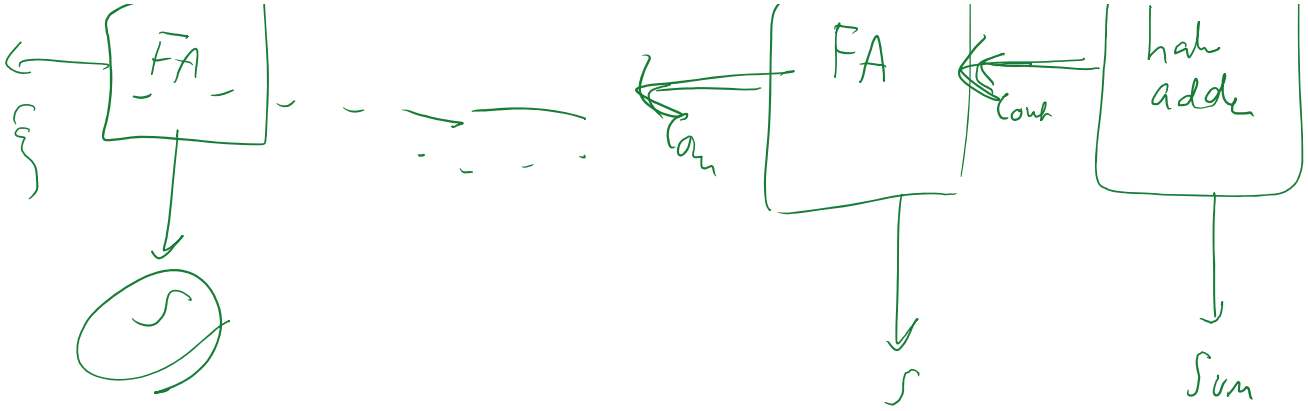
$C_{out} =$










FA
FA
half adder
Cout
Cout
S
S
Sum