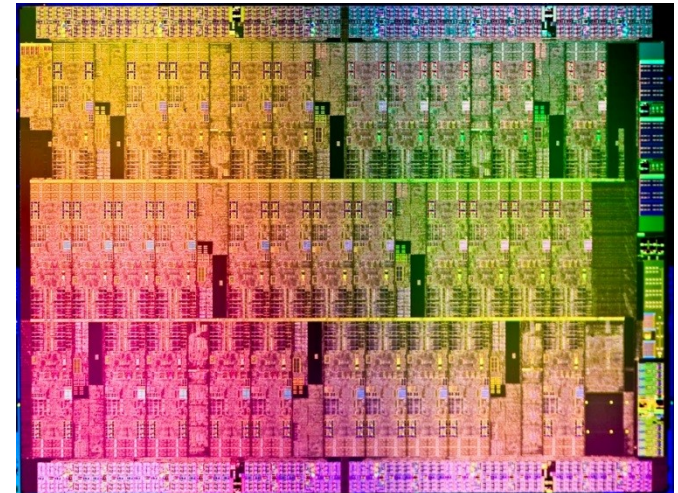


Digital logik

- analoga vs digitala signaler
- binära talsystemet
- logiska grindar (NOT, AND, NAND, NOR, OR)
- De Morgan's lagar
- kedja av grindar för beräkningar
- CMOS - n-MOSFET / p- MOSFET
- Logiska grindar med transistorer
 - NOT
 - NAND

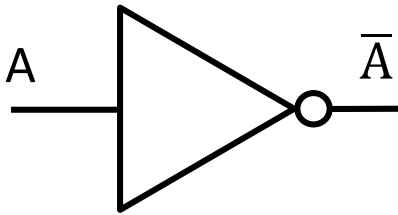


Läsning i Hambley: 7.1 - 7.3 och 12.7

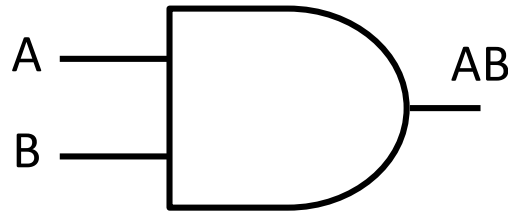
Johannes Svensson, johannes@eit.lth.se

Logiska grindar

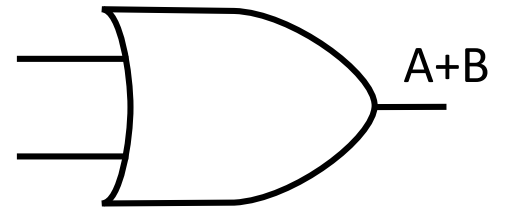
NOT
(inverterare)



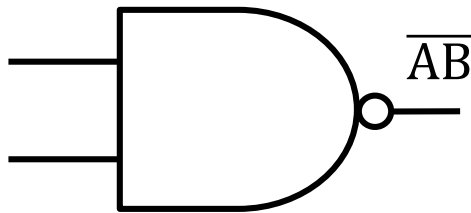
AND



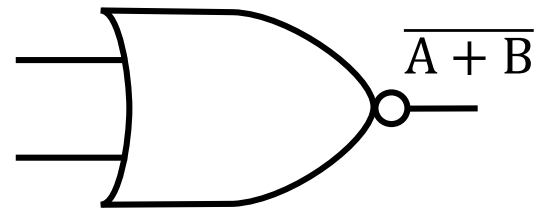
OR



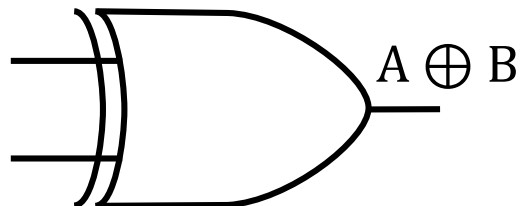
NAND (NOT AND)



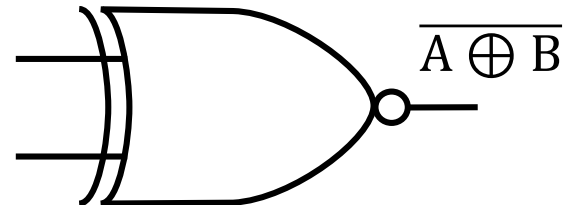
NOR (NO



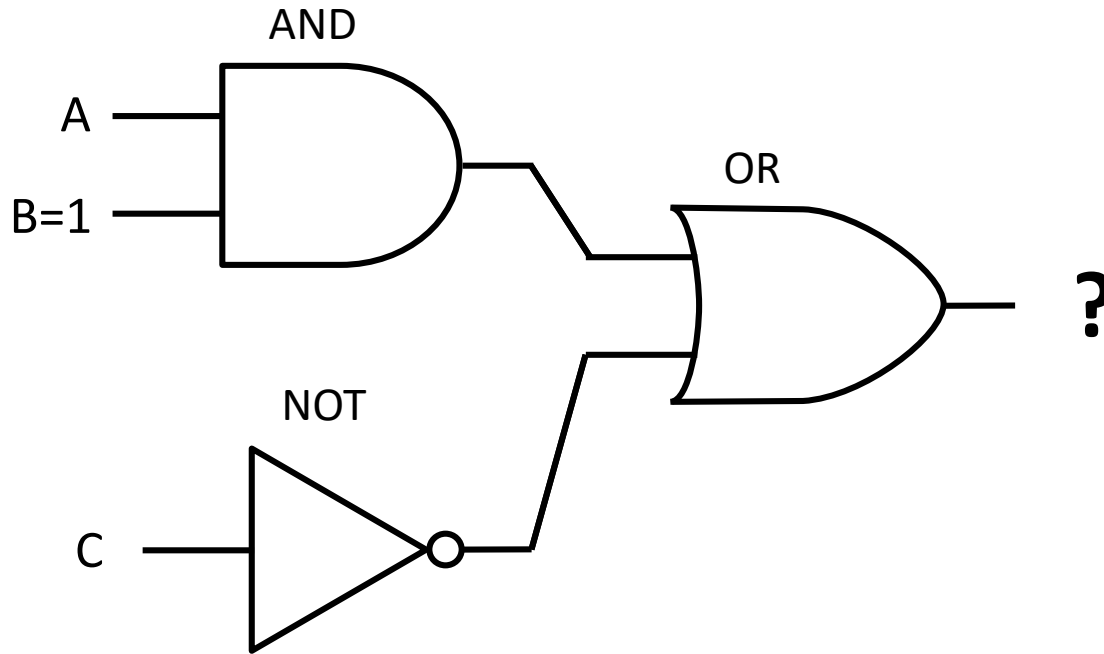
XOR (Exclusive OR)



XNOR (Exclusive NOT OR)



Fråga: Sammankopplade grindar



A

A	B	C	UT
0	1	0	1
1	1	0	0
0	1	1	1
1	1	1	0

B

A	B	C	UT
0	1	0	1
1	1	0	1
0	1	1	0
1	1	1	1

C

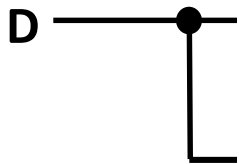
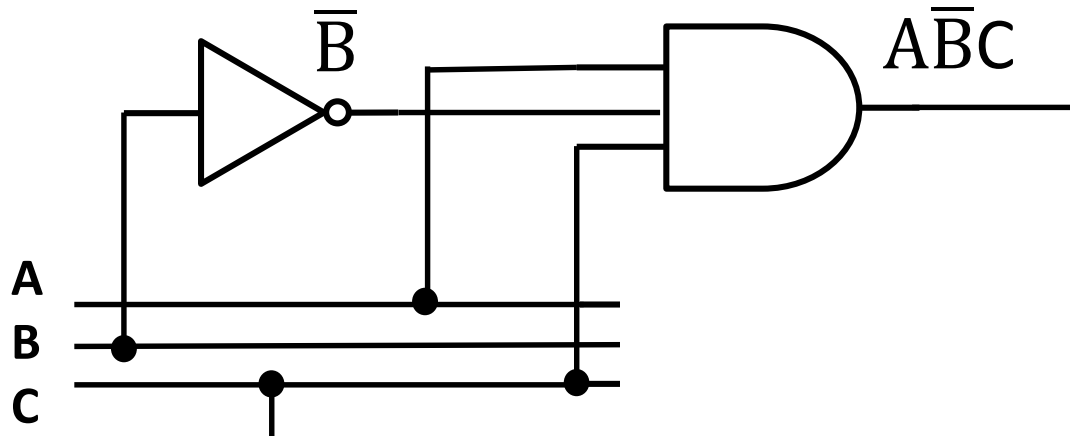
A	B	C	UT
0	1	0	0
1	1	0	0
0	1	1	1
1	1	1	1

D

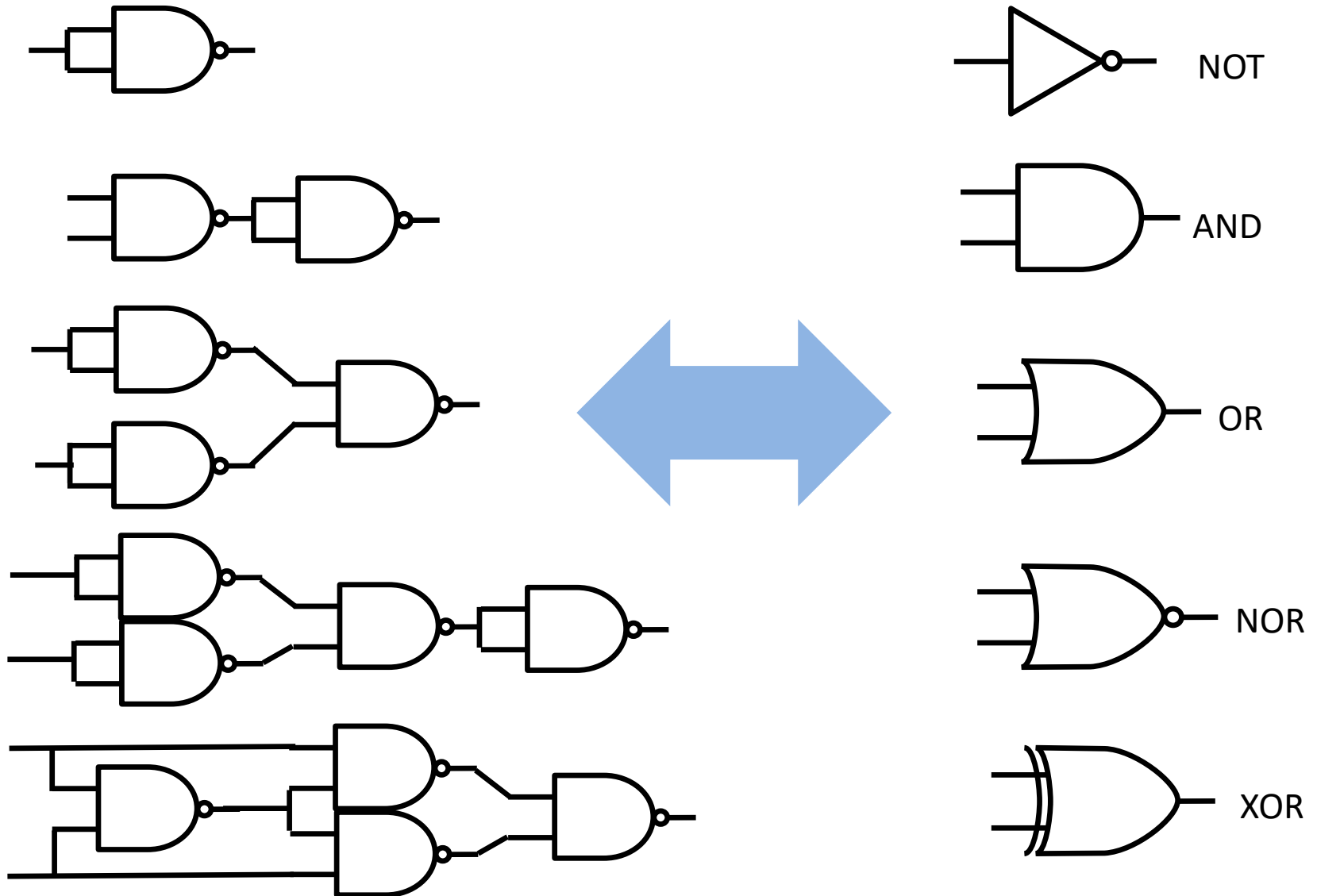
???

Boolska beräkningar

$$F = A\bar{B}C + ABC + (C+D)(\bar{D} + E)$$

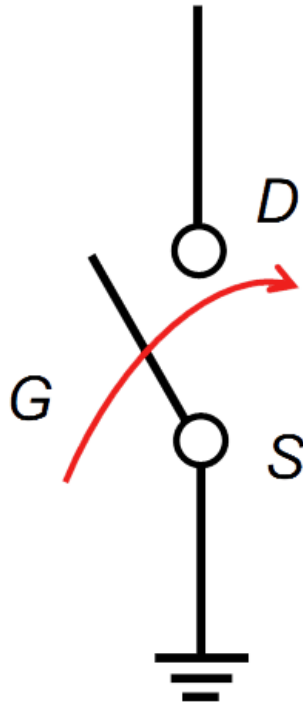


NAND som universell grind

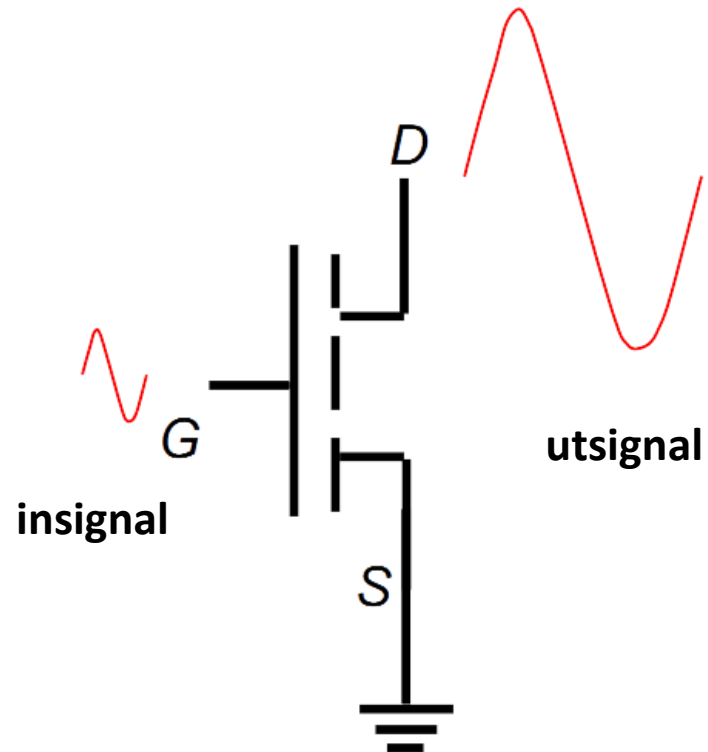


Transistorer för digital logik

strömbrytare



förstärkare

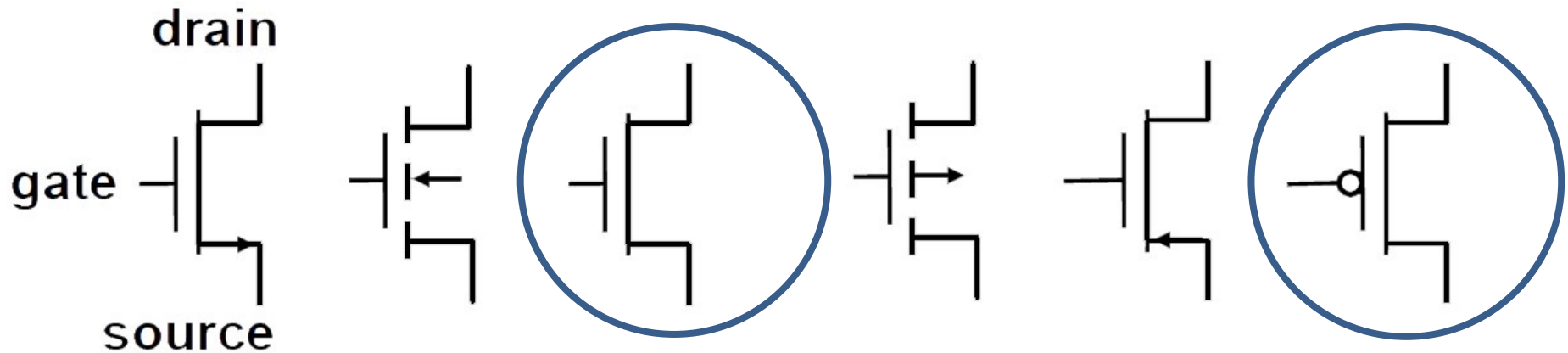


CMOS

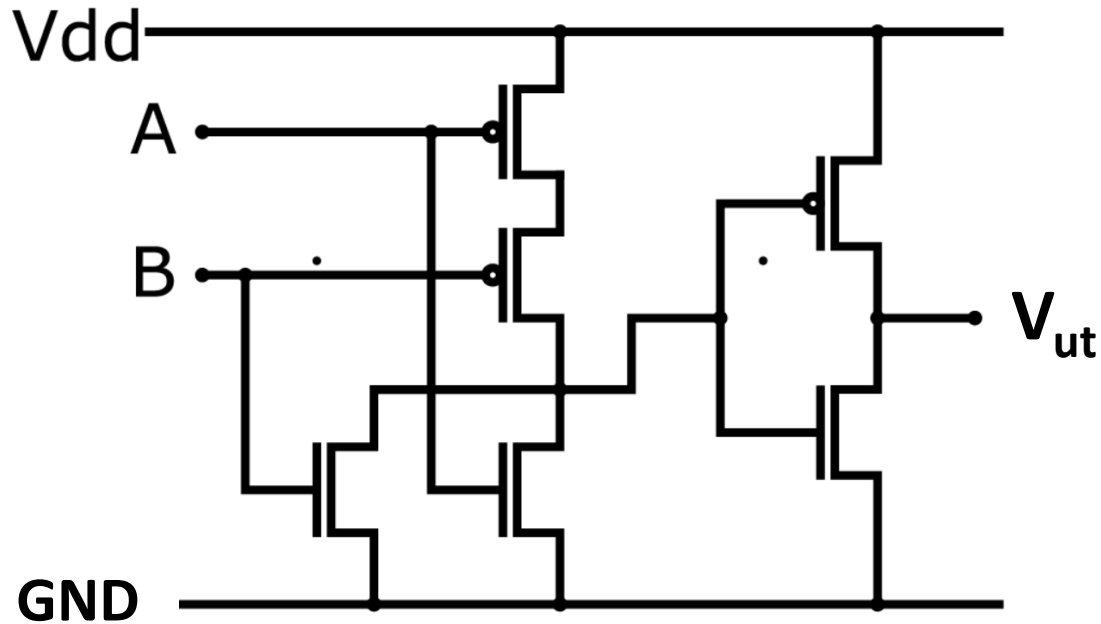
- CMOS = complementary metal-oxide-semiconductor
- MOSFET = metal-oxide-semiconductor field-effect transistor
- Två typer av transistorer: n -MOSFET och p-MOSFET

NMOS

PMOS



Fråga: sanningstabel för CMOS koppling?



A

A	B	UT
0	0	0
1	0	1
0	1	1
1	1	1

B

A	B	UT
0	0	1
1	0	1
0	1	1
1	1	0

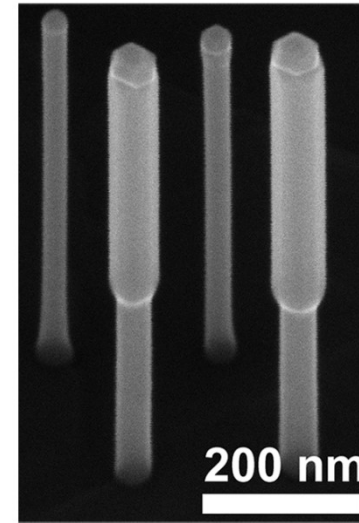
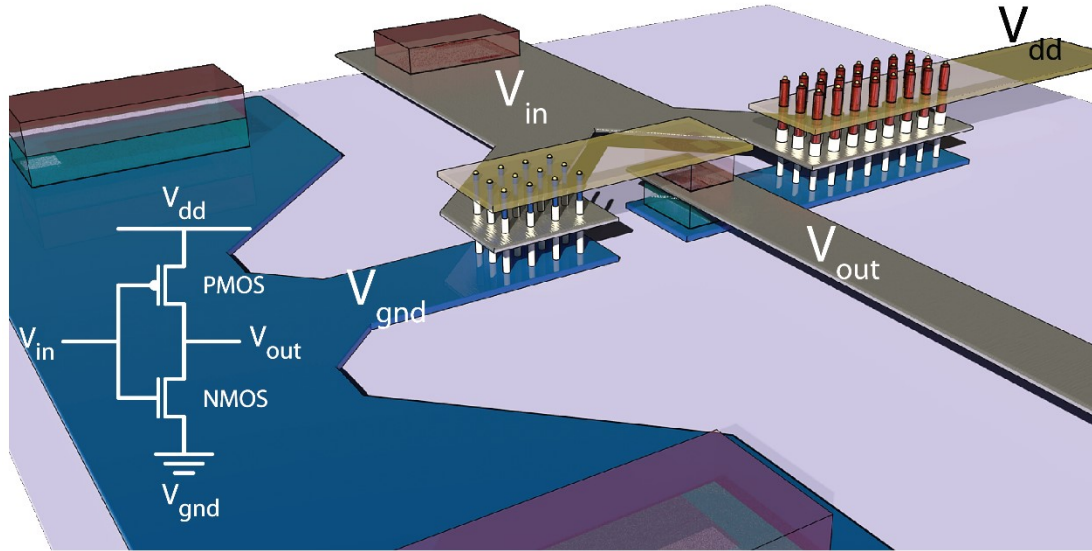
C

A	B	UT
0	0	0
1	0	1
0	1	1
1	1	0

D

???

NOT (inverterare) med III-V nanotrådar



InAs NMOS
GaSb PMOS

