Digital Circuits 1: EECD 2200 Lecture 2

Bit = 1 bit

nibble = 4 bits

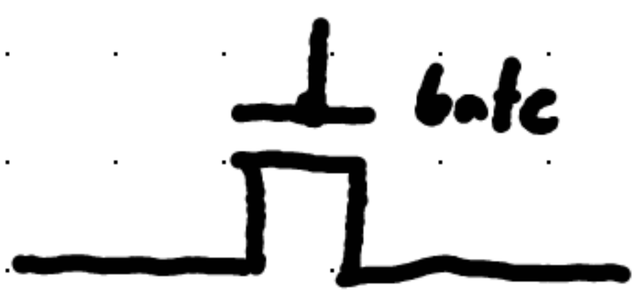
byte = 8 bits

	Binary 0	Binary 1
Switch Logic	Circuit open	Circuit closed
TTL	0-0.8V	2.0-5.0V
CMOS, 3.3V Logic Most Circuits Now	0-0.8V	2.0-3.3V
Dynamic Memory On Chip Rom Volatile Key	Capacitor discharged Not Blown	Capacitor charged Blown

Ideal Switches - Mos Transistors

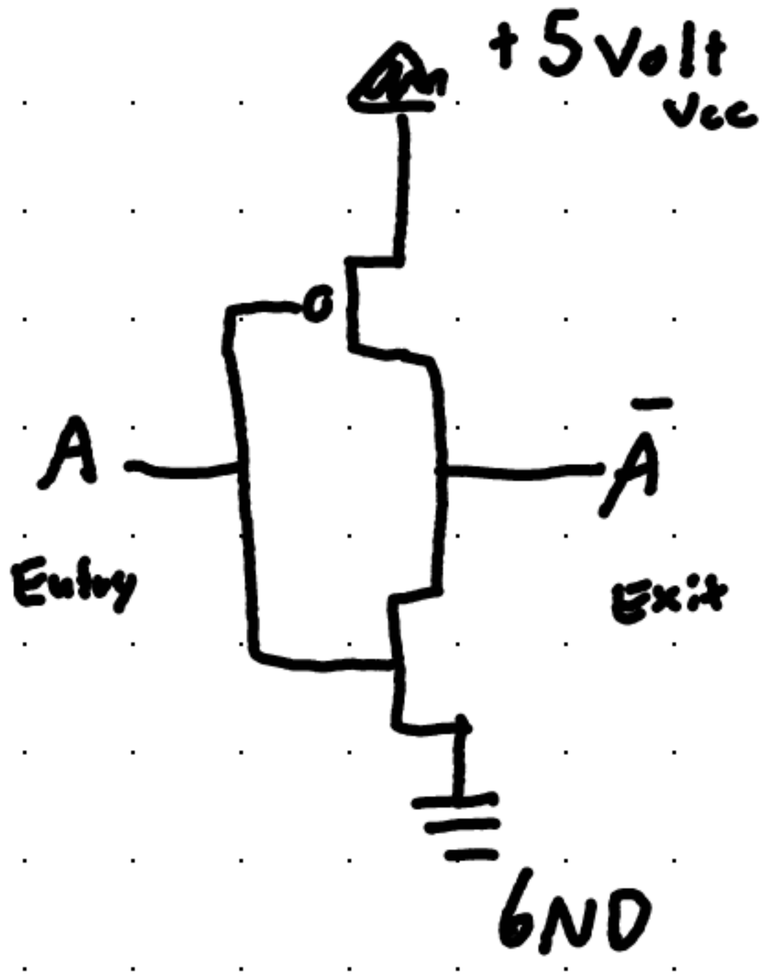
NMos - Requires positive "High Gate" Voltage to close

PMos - Requires negative "low gate" Voltage to close



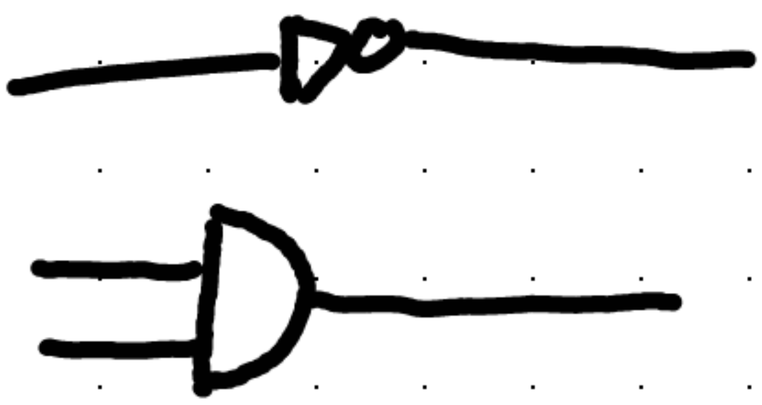
NMos and PMos Transistors can be Put on the same CHIP. They can be Complimentary to each other this way! one turns another OFF!

Pmos Inverter Diagram



O ← This little bubble represents negation

Logic Gates

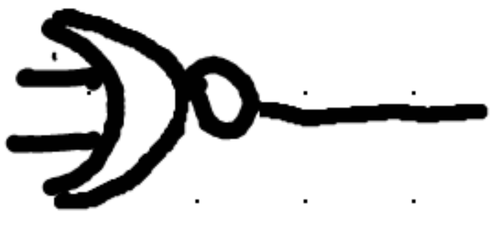


NOT gate

AND

OR

NAND



NOR

Fundamental Gates!

XOR

XNOR

"Odd number of Inputs High, output should be high"

"Even number of Inputs high, Output is high"

Truth Tables — For Gates

NOT

A	$\bar{A}$
0	1
1	0

AND

B	A	AB
0	0	0
0	1	0
1	0	0
1	1	1

NAND

B	A	$\overline{AB}$
0	0	1
0	1	1
1	0	1
1	1	0

OR

B	A	A+B
0	0	0
0	1	1
1	0	1
1	1	1

NOR

B	A	$\overline{A+B}$
0	0	1
0	1	0
1	0	0
1	1	0

XOR

B	A	$A \oplus B$
0	0	0
0	1	1
1	0	1
1	1	0

XNOR

B	A	$A \odot B$
0	0	1
0	1	0
1	0	0
1	1	1

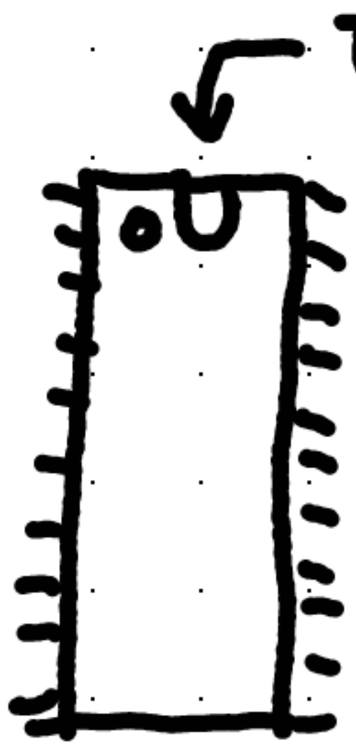
Boolean Addition

$0 + 0 = 0$

$0 + 1 = 1$

$1 + 1 = 1$

Significance of Model Numbers



Prefix

74: Commercial Temperature Range

54: Military Temperature Range

Number		Significance
7400	→	NAND gate
7408	→	AND gate
7402	→	NOR gate
7486	→	XOR gate
7432	→	OR gate
7404	→	INV gate