

Lecture 4: Truth Tables and More Boolean Functions

CSE 370, Autumn 2007
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Last Lecture's Daily Quiz

- In 2's complement, the number of bits matters
 - 110 is not a 4-bit 2's comp. number
 - 0110 is
- "Flip the bits" means replace 1's with 0's and 0's with 1's in each bit position
- Remember to add 1

Where We Are

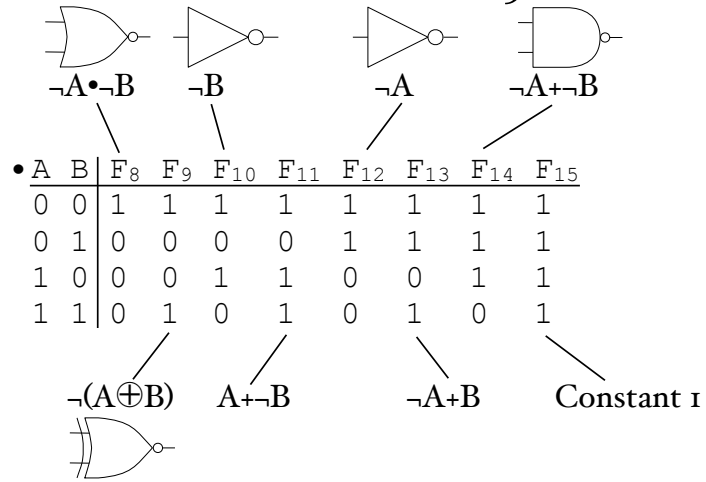
- Last lecture: Boolean algebra
- This lecture: Truth tables and lots of "useful" Boolean functions
- Next lecture: Canonical forms
- Homework 1 due today. Homework 2 out
- In the midst of lab 1
 - Slight modification of lab late policy

Truth Tables (0-7)

A	B	F ₀	F ₁	F ₂	F ₃	F ₄	F ₅	F ₆	F ₇
0	0	0	0	0	0	0	0	0	0
0	1	0	0	0	0	1	1	1	1
1	0	0	0	1	1	0	0	1	1
1	1	0	1	0	1	0	1	0	1

Constant 0 A•¬B ¬A•B A⊕B
 A•B A B A+B

Truth Tables (8-15)



Proof by Truth Table

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

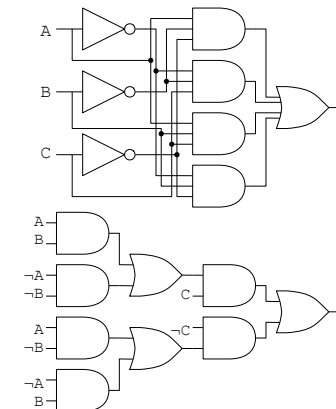
Comparing Two Numbers

A	B	C	D	F
0	0	0	0	0
0	0	0	1	0
0	0	1	0	0
0	0	1	1	0
0	1	0	0	1
0	1	0	1	0
0	1	1	0	0
0	1	1	1	0
1	0	0	0	1
1	0	0	1	1
1	0	1	0	0
1	0	1	1	0
1	1	0	0	1
1	1	0	1	1
1	1	1	0	1
1	1	1	1	0

Full Adder

$$S = A\neg B\neg C + \neg A\neg BC + ABC + \neg A\neg B\neg C$$

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



Now You Try

$$F = \neg A + BC$$

A	B	C	F
0	0	0	
0	0	1	
0	1	0	
0	1	1	
1	0	0	
1	0	1	
1	1	0	
1	1	1	

Now You Try

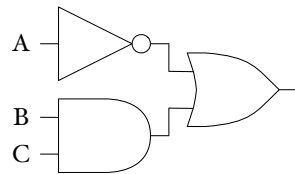
$$F = \neg A + BC$$

A	B	C	F
0	0	0	1
0	0	1	1
0	1	0	1
0	1	1	1
1	0	0	0
1	0	1	0
1	1	0	0
1	1	1	1

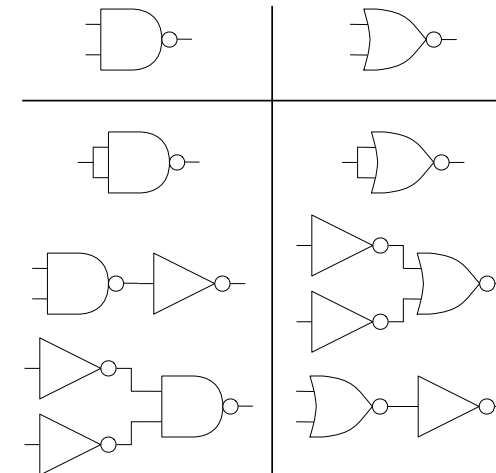
Now You Try

$$F = \neg A + BC$$

A	B	C	F
0	0	0	1
0	0	1	1
0	1	0	1
0	1	1	1
1	0	0	0
1	0	1	0
1	1	0	0
1	1	1	1



Universal Gates



• NOT:

• AND:

• OR:

Thank You for Your Attention

- Start looking at homework 2
- Continue reading the book