Symbolic Logic

- Deals with the representation and technique of algebra that separates the meaning of factual statements and from proofs of their consistency and their truth values

Binary Operators

Common Operators

OR

- $Y = A + B$

A	B	Y
0	0	0
0	0	0
1	0	1
1	1	1

NOT

- $Y = \overline{A}$

A	Y
0	1
1	0

BUF

- $Y = A$

A	Y
0	0
1	1

AND

- $Y = AB$

A	B	Y
0	0	0
0	0	0
1	0	0
1	1	1

XOR

- $Y = A \oplus B$

A	B	Y
0	0	0
0	0	1
1	0	1
1	1	0

NAND

- $Y = \overline{AB}$

A	B	Y
0	0	1
0	0	1
1	0	1
1	1	0

NOR

- $Y = \overline{A + B}$

A	B	Y
0	0	1
0	0	0
1	0	0

A	B	Y
1	1	0

XNOR

- $Y = \overline{A \oplus B}$

A	B	Y
0	0	
0	0	
1	0	
1	1	

Precedence

- Parenthesis
- NOT
- AND (AND, NAND)
- OR (OR, NOR, XOR)

Truth Tables

- Consider a Boolean function N containing n Boolean variables $a_0, a_1, \ldots, a_{n-1}$
- A truth table may be constructed containing 2^n rows which gives the value of N for every combination of truth values of the variables $a_0, a_1, \ldots, a_{n-1}$

Evaluating Logical Expressions

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- Negation
- Ex. ~(AB) is the negation of A and$B$

$\rightarrow$

- Implication
- Ex. $A \rightarrow B$
  - True except when A is true but B is false

Tautology

- A logical expression that is true for every combination of truth values of its variables