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INTRODUCTION TO COMPUTERS

Truth Table

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TRUTH TABLE

A truth table is a handy little logical device that shows up not only in mathematics, but also in Computer Science and Philosophy, making it an awesome interdisciplinary tool. The notation may vary depending on what discipline you're working in, but the basic concepts are the same.

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TRUTH TABLE

MULTIPLE POSSIBILITIES?

SCHRÖDINGER'S CAT EXPERIENCE
(PHYSICIST ERWIN SCHRÖDINGER IN 1935)

IN COMPUTER SCIENCE WE ONLY HAVE ONE TRUTH

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WHAT IS BOOLEAN ALGEBRA?

Boolean Algebra is a branch of algebra that involves bools, or true and false values. They're typically denoted as ***T or 1 for true*** and ***F or 0 for false***. Using this simple system we can boil down complex statements into digestible logical formulas.



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UNARY OPERATORS

- **UNARY OPERATORS ARE THE SIMPLEST OPERATIONS BECAUSE THEY CAN BE APPLIED TO A SINGLE TRUE OR FALSE VALUE.**

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UNARY OPERATORS

- **Negation**

- The **negation operator** is commonly represented by a tilde (\sim) or \neg symbol. It negates, or switches, something's truth value.

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NEGATION

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NEGATION

- We can show this relationship in a truth table. A **truth table** is a way of organizing information to list out all possible scenarios.
- We title the first column p for proposition. In the second column we apply the operator to p, in this case it's $\sim p$ (read: not p). So as you can see if our premise begins as True and we negate it, we obtain False, and vice versa.



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NEGATION

p	$\sim p$
T	F
F	T

or

p	$\sim p$
1	0
0	1



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BINARY OPERATORS

- Binary operators require two propositions.
- We'll use p and q as our sample propositions.

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BINARY OPERATORS

- **AND**

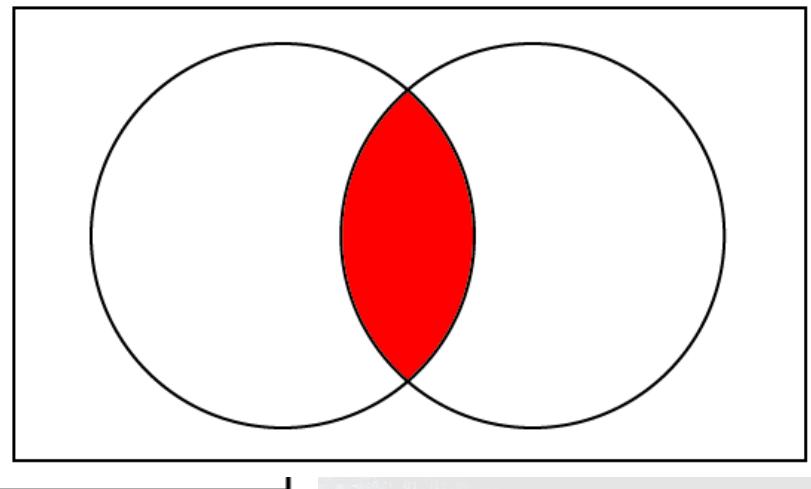
The **AND operator** (symbolically: \wedge) also known as **logical conjunction** *requires* both p and q to be True for the result to be True. All other cases result in False. This is logically the same as the intersection of two sets in a Venn Diagram.

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p	q	$p \wedge q$
T	T	T
T	F	F
F	T	F
F	F	F



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BINARY OPERATORS

- OR

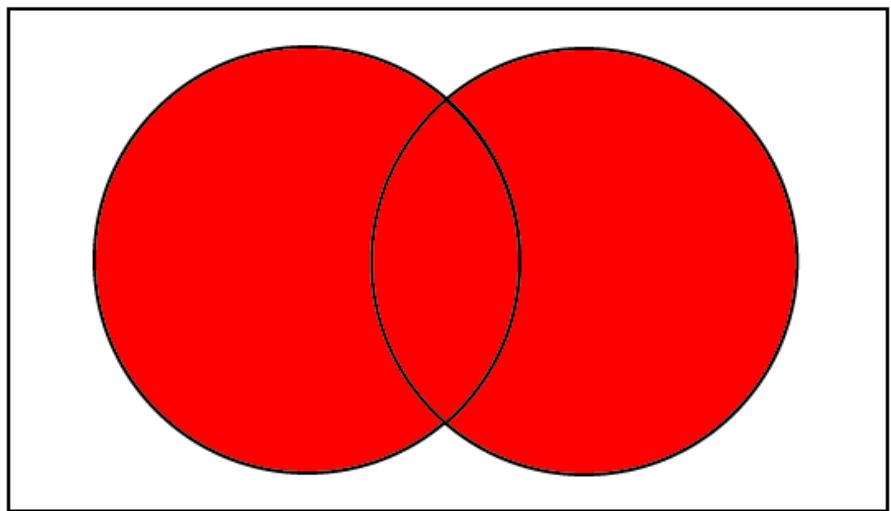
The **OR operator** (symbolically: \vee) requires only one premise to be True for the result to be True. This is equivalent to the union of two sets in a Venn Diagram.

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p	q	$p \vee q$
T	T	T
T	F	T
F	T	T
F	F	F



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- NOR

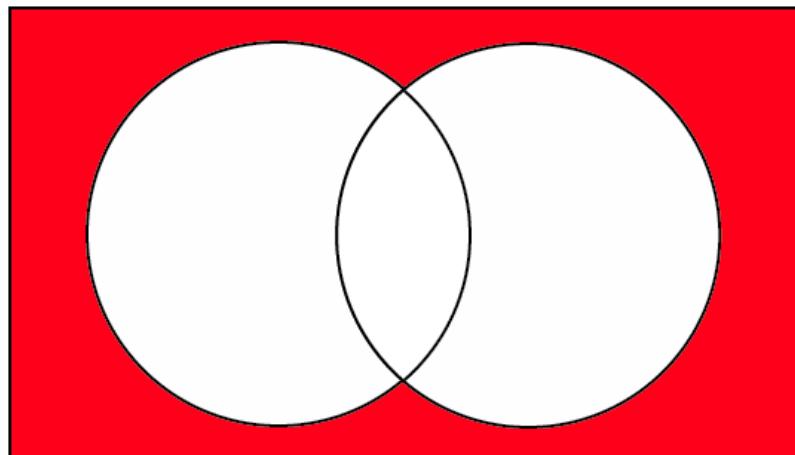
Logical **NOR** (symbolically: \downarrow) is the exact opposite of OR. It requires both p and q to be False to result in True.

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p	q	$p \downarrow q$
T	T	F
T	F	F
F	T	F
F	F	T



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BINARY OPERATORS

- **XOR**

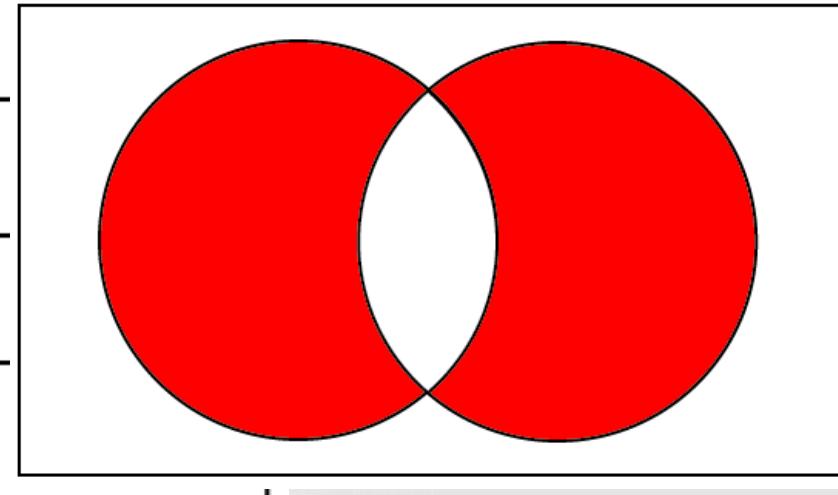
Exclusive Or, or **XOR** for short, (symbolically: \vee) requires exactly one True and one False value in order to result in True.

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p	q	$p \vee q$
T	T	F
T	F	T
F	T	T
F	F	F



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SUPPLEMENTARY INFORMATION

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<https://www.youtube.com/watch?v=VCEYeB3bRW0>

- Video Tutorial about truth Table



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EXERCISE: COMPLETE THE TRUTH TABLE

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P(Proposition)	Q(Proposition)	$\sim P$	$P \wedge Q$	$P \vee Q$	$P \downarrow Q$	$P \veebar Q$



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Thank You!

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