LOGIC

A proposition or statement is a declarative sentence that can be classified as either true or false but not both.

Examples

- San Francisco is the capital of California.
- Be quiet! NO − & Commond
- Texas is east of California or it is west of California. Statement
 When is the next exam? NO guestion
 The Exam 1 results were good. A prop If "good" isolatined
- x + 1 = 4 A prop if x is defined
- Miami Beach has 10¹⁰ grains of sand.

A prime or simple proposition expresses one thought

9: Austrn in the cap. of TX.

Join propositions with logical connectives to form compound propositions.

conjunction

negation

disjunction

p: San Francisco is the capitol of California.

q: Austin is the capitol of Texas.

What is $p \wedge q$ in words? Is this proposition true or false? Let the cap of Calif and Aventus the cap of Texas. Jabe

In general, The conjunction for q is true only if both p and q are true

Show this in a *truth table*,

p	q	$p \wedge q$
T	T	4
T	F	
F	T	E,
F	F	L, L

p: San Francisco is the capitol of California.

What is $p \vee q$ in words? Is this proposition true or false? St whe cap of of or Austra is the cap of TX In general, The disjunction pvg is false only if both pand q are false.

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

This is called the *inclusive disjunction*. This is also the mathematical *or*.

Exclusive disjunction is $\underline{\vee}$. This is true only if exactly one of the two statements is true.

p: San Francisco is the capitol of California. \vdash

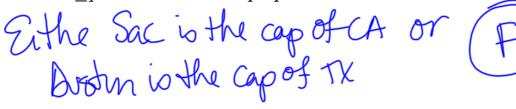
q: Austin is the capitol of Texas. op

What is $p \underline{\vee} q$ in words? Is this proposition true or false?

Either Stiothe capof CA or (Austrn to the cap of TX

r: Sacramento is the capitol of California.

What is $r \vee q$ in words? Is this proposition true or false?



Show this in a truth table,

p	q	p
T	T	F
T	F	1
F	T	T
F	F	F

Negation: $\sim p$ means not p. Show this in a truth table:

p	$\sim p$
T	F
F	T

Write the following statements symbolically and find the truth table.

The car is blue or has a moon roof.

p: The our is blue

q: The car has a moon noof

The book is not red and the subject is history.

p: The book is red

q: The subject is history

The sky is not blue or the grass is not purple.

p: The sky is dur q: The grassis purple

Define the following statements:

p: The student is a girl.

q: The student is a biology major.

r: The student is enrolled in a math class.

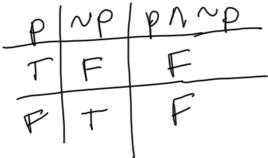
Write the following statements symbolically and find the truth table.

The student is a boy and is not a biology major or enrolled in a math class.

^	ρ/	(9	Vr)			
p	9	r	gvr	NP	NPN(gVr)
TTT	TTC	741	T T T	FFF	FFF	
+	F	E	F	F	F T-	> boy Blo major in math class
FF	T	F	1	T	T	not in moth classed Boy hot Bio may una moth class
F	F	TF	1 +	, 1	1 ,	

A statement is a *contradiction* if the truth value of the statement is always false.

Example: Find the truth table for $p \land \sim p$



A statement is a *tautology* if the truth value of the statement is always true.

Example: Find the truth table for $p \lor (\sim p \lor q)$ $p \downarrow q$ $p \downarrow q$

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