

Text Chapter 3 – Sections 1, 2

Conjunction

A conjunction is a compound proposition which consists of two propositions joined by the connective "and" (but, however, also). Denoted p q.

- 9 is divisible by 3 and 4 is an odd number.
 2 + 5 = 10 but 16 is a multiple of 3.
- A proposition is either true or false. It cannot be both.
- So under what conditions is a conjunction true?

No in-class assignment problem

Truth Values for Conjunctions You decide!

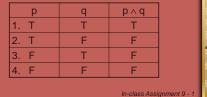
- Stryket Rich won a TV set and \$1000. He was overheard telling about his winnings to 4 people.
- Decide to whom he told the truth.
 Jane: I won a TV and \$1000.
 John: I won a TV and a video camera.
 - John. I won a TV and a video camera.
 - Ed: I won a car and \$1000.
 - Mary: I won a car and a video camera.

In-class Assignment 9 -

Truth Table for Conjunctions

Need a heading row and 4 more rows for each possible combination (<u>condition</u>) of true and false. Need a column for each proposition and one for the conjunction.

A conjunction is true only if both propositions are true.





Disjunction

A disjunction is a compound proposition which consists of 2 propositions joined by the connective "<u>or</u>." Denoted p vq.

"Or" has two meanings in our language. Use the inclusive or which is the legal and/or type.

No in-class assignment problem

Truth Values of a Disjunction You Decide.

John bragged that he could roll a 2 or a 5 when rolling a die twice. He rolled his die twice with the following results for 4 people.
Ida: He rolled a 2 and then a 5.
Sean: He rolled a 2 and then a 6.
Mary: He rolled a 6 and then a 5.
Harry: He rolled a 6 and then a 4.

In which of the cases was John's brag true?

In-class assignment 9 - 2

Truth Table for the Disjunction

 Make the table as for the conjunction.
 A disjunction is false only if both propositions are false.

1. T T T 2. T F T		~	nva
	р	q	p ∨ q
2. T F T 3. F T T 4. F F F	1. T	Т	Т
3. F T T 4. F F F		F	Т
4. F F F	3. F	Т	Т
	4. F	F	F

In-class Assignment 9 - 2

Conditional or Implication

A conditional proposition is a compound proposition which consists of 2 propositions joined by the connective "If …then …". Denoted p → q.

D → q is read "If p then q" or "p implies q."

No in-class assignment problem

In-class Assignment 9 -

Truth Values of a Conditional Proposition – You Decide

- Suppose the first day a class I made you the promise that if you studied hard then I would give you an A.
- Decide when I kept my promise.
- 1. You studied hard and you got an A.
- 2. You studied hard but didn't get an A.
- 3. You didn't study hard and got an A.
- 4. You didn't study hard and you didn't get an A.

In-class Assignment 9 - 3

Truth Table for Conditionals

Make the truth table in the same way as for the conjunction and disjunction.
 A conditional is false only when T→F.

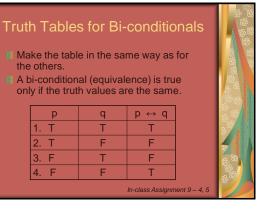
р	q	$p \rightarrow q$	
1. T	Т	Т	
2. T	F	F	
3. F	Т	Т	
4. F	F	Т	
		In-class Ass	ignment 9 - 3

Bi-conditional or Equivalence

A bi-conditional proposition is a compound proposition which consists of 2 propositions joined by the connective phrase "if and only if."

Denote: $p \leftrightarrow q$.

- Meaning: $(p \rightarrow q) \land (q \rightarrow p)$
- It is read as "p if \rightarrow and only if q."
- The word equivalence implies the truth value is true if the propositions have the same truth value.



Rules of Logic

- Negation change the truth value.
 Conjunction True only if both are true.
- Disjunction False only if both are false or true if at least one is true.
 Conditional False only if true points
- to false.
- Bi-conditional True if the truth values are the same.

No in-class assignment problem

Trut							
р	q	p∧q	p∨q	$p \rightarrow q$	p ↔ d		
1. T	Т	Т	Т	Т	Т		
2. T	F	F	Т	F	F		
3. F	Т	F	Т	Т	F		
4. F	F	F	F	Т	Т	States and a state of the state	
	In-class Assignment 9 - 5						