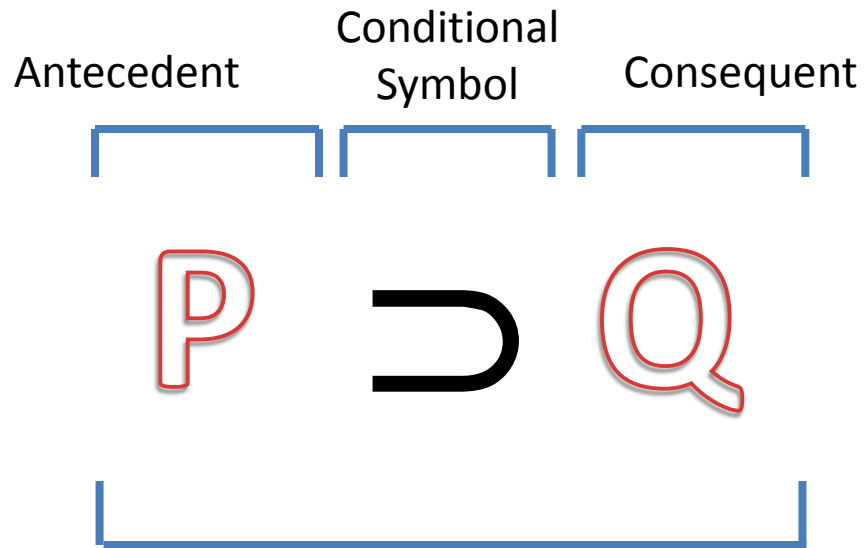# Philosophy 104

6.3 Notes

Recap:

- Propositional Logic is composed of:
  - Propositional Variables
    - Lower-case letters: p, q, r, etc.
  - Truth-Functional Connectives
    - ~ (Negation)
    - & (Conjunction)
    - v (Disjunction)
    - ⊃ (Material Conditional)
  - Punctuation [()]

The Material Conditional

Antecedent Conditional Symbol Consequent

P ⊃ Q

Conditional

Material Conditional and the English 'If…Then…'

- The Material Conditional is similar to some instances of the English "If…Then…" but not others.

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- Consider the truth value of:
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Material Conditional and the English 'If…Then…'

- The Material Conditional is similar to some instances of the English "If…Then…" but not others.

- Consider the truth value of:
  - "If there is an elephant in the room, then it is raining."
  - It's TRUE! (as long as there is no elephant in the room, or as long as it is raining)

Material Conditional and the English 'If...Then...'

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- The sentence is true or false based on the truth of its parts and how those parts are connected.

Material Conditional and the English 'If...Then...'

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- The sentence is true or false based on the truth of its parts and how those parts are connected.

Material Conditional and the English "If...Then..."

- Consider the truth-value of:
  - "If two plus two is four then Rio de Janeiro is in Chile"

Material Conditional and the English "If…Then…"

- Consider the truth-value of:
  - "If two plus two is four then Rio de Janeiro is in Chile"
  - It's FALSE
  - Why?

Material Conditional Definition

P	Q	P ⊃ Q
T	T	
T	F	
F	T	
F	F	

Material Conditional Definition

P	Q	P ⊃ Q
T	T	T
T	F	
F	T	
F	F	

Very Straightforward. "If you clean out the barn, then I pay you $5." is true when it is true that you clean out the barn and true that I pay you $5.

Material Conditional Definition

P	Q	P ⊃ Q
T	T	T
T	F	F
F	T	
F	F	

Also Straightforward. "If you clean out the barn, then I pay you $5." is false when it is true that you clean out the barn and false that I pay you $5. At this point, I have lied to you and you'll want to beat me up.

Material Conditional Definition

P	Q	P ⊃ Q
T	T	T
T	F	F
F	T	T
F	F	

Now, say you don't clean out the barn. I might decide to give you $5 out of kindness, in which case I haven't lied to you when I said, "If you clean out the barn, then I pay you $5."

Material Conditional Definition

P	Q	P ⊃ Q
T	T	T
T	F	F
F	T	T
F	F	T

Say you don't clean out the barn and so I don't give you $5. I haven't lied to you when I said, "If you clean out the barn, then I pay you $5."

Other kinds of conditionals

- Remember: "If there is an Elephant in the room, then it is raining."
  - The above is true (barring an elephant being in the room and clear weather when I present these notes)

Other kinds of conditionals

- Remember: "If there is an Elephant in the room, then it is raining."
  - The above is true (barring an elephant being in the room and clear weather when I present these notes)
  - If you think it must be false, you are reading it as a causal conditional, which is a material conditional with extra baggage. In a causal conditional "If P then Q" means "P causes Q".

Other kinds of conditionals

- Consider symbolizing: "If I were you, then I would make popcorn"

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Other kinds of conditionals

- Consider symbolizing: "If I were you, then I would make popcorn"
  - Notice that there are not *two* propositions expressed because 'I were you' does not express a proposition by itself, nor does 'I *would* make popcorn'.
  - This is a counterfactual, or subjunctive conditional. It is best symbolized 'p' because it expresses one whole state of affairs.

Material Conditional Equivalence

- Consider whether the following are logically equivalent:
  - "If you clean the barn I'll pay you $5."
  - "Either you don't clean the barn, or I'll pay you $5"

Material Conditional Equivalence

- Consider whether the following are logically equivalent:
  - "If you clean the barn I'll pay you $5."
  - "Either you don't clean the barn, or I'll pay you $5"
- The preceding are symbolized:
  - C ⊃ P
  - ~C v P

Material Conditional Equivalence

P	Q	~P	v	Q
T	T	F	**T**	T
T	F	F	**F**	F
F	T	T	**T**	T
F	F	T	**T**	F

Material Conditional Equivalence

P	Q	~P	v	Q	P ⊃ Q
T	T	F	**T**	T	**T**
T	F	F	**F**	F	**F**
F	T	T	**T**	T	**T**
F	F	T	**T**	F	**T**

Material Conditional Equivalence

- Many students want to make a conditional false when the antecedent is false. That would make the symbol '⊃' mean the same thing as the '&'.

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- Does 'If P then Q' mean the same thing as 'P and Q'?

Material Conditional Equivalence

- Does 'If P then Q' mean the same thing as 'P and Q'?

- Clearly not. The person who utters the latter is asserting the truth of both P and Q while the person who utters the former is asserting neither the truth nor falsity of either P or Q.

Material Conditional Equivalence

- The material conditional asserts a relationship between P and Q that is false when the antecedent (P) is true while the consequent (Q) is false, and true otherwise.

Exercise XXVII

7. If the house comes up for sale, and I have the money in hand, I will bid on it.

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(S & M) ⊃ B

Exercise XXVII

8. If you come to dinner, I will cook you a lobster, if you want me to.

Exercise XXVII

8. If you come to dinner, I will cook you a lobster, if you want me to.

D ⊃ (W ⊃ L)

Exercise XXVII

9. You can be a success if only you try.

10. You can be a success only if you try.

Exercise XXVII

9. You can be a success if only you try.

T ⊃ S

10. You can be a success only if you try.

S ⊃ T

Example: Ex. 24 #5

- Argument is:

p	q	r

$p \supset q$

$q \supset r$

$\underline{\sim r}$

$\sim p$

- Step 1: Create the reference columns:

Step 2, One column for each connective:

p	q	r	p ⊃ q	q ⊃ r	~r	~p

Step 3: Fill In Reference Columns

p	q	r	p ⊃ q	q ⊃ r	~r	~p
T	T	T				
T	T	F				
T	F	T				
T	F	F				
F	T	T				
F	T	F				
F	F	T				
F	F	F				

Step 4: Fill in remainder

p	q	r	p ⊃ q	q ⊃ r	~r	~p
T	T	T				
T	T	F				
T	F	T				
T	F	F				
F	T	T				
F	T	F				
F	F	T				
F	F	F				

Step 4: Fill in remainder

p	q	r	p ⊃ q	q ⊃ r	~r	~p
T	T	T	T			
T	T	F	T			
T	F	T				
T	F	F				
F	T	T				
F	T	F				
F	F	T				
F	F	F				

Step 4: Fill in remainder

p	q	r	p ⊃ q	q ⊃ r	~r	~p
T	T	T	T			
T	T	F	T			
T	F	T	F			
T	F	F	F			
F	T	T				
F	T	F				
F	F	T				
F	F	F				

Step 4: Fill in remainder

p	q	r	p ⊃ q	q ⊃ r	~r	~p
T	T	T	T			
T	T	F	T			
T	F	T	F			
T	F	F	F			
F	T	T	T			
F	T	F	T			
F	F	T	T			
F	F	F	T			

Step 4: Fill in remainder

p	q	r	p ⊃ q	q ⊃ r	~r	~p
T	T	T	T			
T	T	F	T	F		
T	F	T	F			
T	F	F	F			
F	T	T	T			
F	T	F	T	F		
F	F	T	T			
F	F	F	T			

Step 4: Fill in remainder

p	q	r	p ⊃ q	q ⊃ r	~r	~p
T	T	T	T	T		
T	T	F	T	F		
T	F	T	F	T		
T	F	F	F	T		
F	T	T	T	T		
F	T	F	T	F		
F	F	T	T	T		
F	F	F	T	T		

Step 4: Fill in remainder

p	q	r	p ⊃ q	q ⊃ r	~r	~p
T	T	T	T	T	F	
T	T	F	T	F	T	
T	F	T	F	T	F	
T	F	F	F	T	T	
F	T	T	T	T	F	
F	T	F	T	F	T	
F	F	T	T	T	F	
F	F	F	T	T	T	

Step 4: Fill in remainder

p	q	r	p ⊃ q	q ⊃ r	~r	~p
T	T	T	T	T	F	F
T	T	F	T	F	T	F
T	F	T	F	T	F	F
T	F	F	F	T	T	F
F	T	T	T	T	F	T
F	T	F	T	F	T	T
F	F	T	T	T	F	T
F	F	F	T	T	T	T

Step 4: Fill in remainder

p	q	r	p ⊃ q	q ⊃ r	~r	~p
T	T	T	T	T	F	F
T	T	F	T	F	T	F
T	F	T	F	T	F	F
T	F	F	F	T	T	F
F	T	T	T	T	F	T
F	T	F	T	F	T	T
F	F	T	T	T	F	T
F	F	F	T	T	T	T

Check for Validity:

	p	q	r	Premise 1 $p \supset q$	Premise 2 $q \supset r$	Premise 3 ~r	Conclusion ~p
1	T	T	T	T	T	F	F
2	T	T	F	T	F	T	F
3	T	F	T	F	T	F	F
4	T	F	F	F	T	T	F
5	F	T	T	T	T	F	T
6	F	T	F	T	F	T	T
7	F	F	T	T	T	F	T
8	F	F	F	T	T	T	T

meet the MODI

- Modus Ponens

$p \supset q$

$\underline{p\qquad}$

q

- Modus Tollens

$p \supset q$

$\underline{\sim q\qquad}$

$\sim p$

Valid Moduses:

Modus Ponens		
P2	C	P1
p	q	p ⊃ q
T	T	T
T	F	F
F	T	T
F	F	T

Modus Tollens				
		P1	C	P2
p	q	p ⊃ q	~p	~q
T	T	T	F	F
T	F	F	F	T
F	T	T	T	F
F	F	T	T	T

A couple common fallacies: (and trouble with conditionals in general)

- Affirming the consequent

  $p \supset q$

  q _____

  p

- Denying the antecedent

  $p \supset q$

  $\sim p$ _____

  $\sim q$

Hypothetical Syllogism (Chain Argument)

p ⊃ q

q ⊃ r

p ⊃ r

Valid?

Chain Argument (Hypothetical Syllogism)

p	q	r	P1 $p \supset q$	P2 $q \supset r$	C $p \supset r$
T	T	T	T	T	T
T	T	F	T	F	F
T	F	T	F	T	T
T	F	F	F	T	F
F	T	T	T	T	T
F	T	F	T	F	T
F	F	T	T	T	T
F	F	F	T	T	T