Ex: "The fact that you didn't watch that double-header yesterday shows that you are not a baseball fan."

Premise: You didn't watch a double-header.

Conclusion: You are not a fan of baseball.

Ex: "Have you stopped doing drugs?"

This example is of the limited choice type since, no matter if you answer yes or no, the implication is that you have done drugs. It precludes the possibility that you've been clean your whole life.

Written Homework: (Due Fri, Jan 16th.)

pp. 20-21 # 23, 24, 26, 27, 41, 49, 50

§1B Truth Values and Propositions

Definition: Propositions are statements that make a claim. The proposition is either true or false.

Note that:

- Incomplete sentences are never propositions
- Questions are not propositions since they do not make claims.

Propositions are the building blocks of all arguments.

Propositions have several operations that can be performed on them. These are:

NEGATION ($\sim$, NOT)
AND ($\wedge$, Conjunction)
OR ($\vee$, Disjunction)

① Negation operation: Since a proposition is either true or false (not both), we can "negate" the proposition by changing its truth value.

Let F = false and T = true.
If we have some proposition, say
"Jason is 25 years old."
we know he is either 25, or not. Thus the statement is either true or false.

Jason is 25.	
T	
F	

Now consider negating the proposition. If

"Jason is NOT 25 years old." Clearly, if the answer to "Jason is 25 years old." is "True", then the answer to the negation will be "False." Using a Truth Table, we have the representation

P	NOT P
T	F
F	T

The first line shows that if P is true, then $\sim P$ is false. The second line shows the opposite situation.

* Multi-negation

If we have a proposition p, then multi-negation has the following influence:

P	$\sim P$	$\sim\sim P$	$\sim\sim\sim P$	...
T	F	T	F	
F	T	F	T	

Ex: Consider a few examples from p. 34

(2) AND (Conjunction). This is a binary operator that combines two smaller propositions into one larger proposition that is true only if both of the original propositions are true.

Ex: Given P and Q:

P	Q	P AND Q
T	T	T
T	F	F
F	T	F
F	F	F

Ex: Try a few examples from p. 34

③ OR (Disjunction): Combines two propositions to make a new proposition. The proposition is true when one or both of the original propositions are true.

Ex:

P	Q	P OR Q
T	T	T
T	F	T
F	T	T
F	F	F

Ex: Try some on p. 34

④ XOR (Exclusive OR): This is like the regular OR except both propositions being true will yield a false result. IE, the first line of the truth table in the OR section will be:

P	Q	P XOR Q
T	T	F

⑤. Conditional Propositions: These are statements of the form "if p, then q." where p and q are propositions. Here, p is termed the hypothesis and q is termed the conclusion.

Truth table: Given P, Q both propositions.

P	Q	If P, then Q
T	T	T
T	F	F
F	T	T
F	F	T

Ex: See page 35

There are several ways to state conditionals. See chart on page 30 for the list.

Ex: See page 34

There are three variations on a conditional proposition. These are:

Conditional if p, then q.
1) Converse If q, then p
2) Inverse if ~p, then ~q
3) Contrapositive If ~q, then ~p

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Note that the converse is logically equivalent to the inverse. Also, the contrapositive is logically equivalent to the conditional.

Logical equivalence means that two statements (composed of propositions) share the same truth table.

Homework: (Due Mon, Jan 19th)

PP. 33-35 # 29, 31, 33, 40, 42, 44, 58, 64, 67, 75-77, 83, 84, 88, 98, 99, 100.

§ 1C Sets and Venn Diagrams

Definition: Set - a collection of objects with some commonality.

Set notation: One way to represent sets is using brace notation and ellipsis.

Ex: The set of all majuscule letters in the English alphabet

$\{A, B, C, \ldots, Y, Z\}$

Ex: The set of counting numbers

$\{1, 2, 3, \ldots\}$

The first example uses ellipsis to represent the letters D through X. The second example uses