

Logic I: Lecture 02

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Readings refer to sections of the course textbook, *Language, Proof and Logic*.

1. Recap: Validity, Counterexamples

An argument is *logically valid* just if there's no possible situation in which the premises are true and the conclusion false

A *counterexample* to an argument is a possible situation in which its premises are true and its conclusion false.

2. Soundness

An argument is *sound* just if it is logically valid and its premises are true

Whether a sentence is true may change as the world changes.

The same applies to whether an argument is sound.

Whether an argument is logically valid not does change as the world changes.

3. Identity

Reading: §2.2

Principle: If $b=c$ then whatever is true of b is also true of c .

Principle: $a=a$ is never false

LeftOf(a,b)	
b=c	
LeftOf(a,c)	

4. Sentence Letters

Square(a) \vee Square(b)	P \vee Q
\neg Square(a)	\neg P
Square(b)	Q

5. Truth Tables

Reading: §3.1, §3.2, §3.3

Rough guide:

' \wedge ' means and

' \vee ' means or

' \neg ' means not

A	B	$A \vee B$	$A \wedge B$
T	T	T	T
T	F	T	F
F	T	T	F
F	F	F	F

A	$\neg A$
T	F
F	T

6. Complex Truth Tables

P	Q	$\neg(P \wedge Q)$
T	T	
T	F	
F	T	
F	F	

7. Contradictions, Logical Truths and Logical Possibilities

Reading: §2.2

A *contradiction* is a sentence that is false in all possible situations.

A *logical truth* is a sentence that is true in all possible situations.

A *logical possibility* is a sentence that is true in one or more possible situations.