

PH133 Logic Lecture 2

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

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

Logical Validity

Argument 3

1. $(P \wedge Q) \vee R$
2. $P \vee \neg P$

Argument 3b

1. $P \vee \neg P$
2. $P \vee \neg P$

Argument 4

1. $P \wedge \neg P$
2. $(P \wedge Q) \vee R$

$P \vee \neg P$ is a *logical truth*

logical truth defined p. 568

$P \wedge \neg P$ is a *contradiction*

contradiction defined p. 564

Rules of proof

\wedge Elim:

$\begin{array}{|l} P1 \wedge P2 \\ \dots \\ P_i \end{array}$

\wedge Intro:

$\begin{array}{|l} P1 \\ P2 \\ \dots \\ P1 \wedge P2 \end{array}$

=Elim:

$\begin{array}{|l} P(n) \\ n=m \\ \dots \\ P(m) \end{array}$

=Intro

$\begin{array}{|l} n=n \end{array}$

Proofs with conjunction (\wedge)

example

1.	$P \wedge Q$	
2.	$Q \wedge R$	
3.	P	\wedge Elim: 1
4.	R	\wedge Elim: 2
5.	$P \wedge R$	\wedge Intro: 3,4

Proofs with identity

example (with missing justification)

1.	LeftOf(a,b)
2.	$b=c$
3.	
4.	
5.	LeftOf(a,c)