PHL245 Notes

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This note is intended for those who has a entry-level of mathematical background. It is worth noticing that, this note alone will not prepare you for the tests. If you are unfamiliar with some of the terms used below, please watch the videos to find out.

1 Validity

Statement	
Tautology	All TVAs True
Contradiction	All TVAs False
Contingent	Some TVAs True and some TVAs False

Set of Statements	
Consistent	At least one TVA is True for all statements
Contradiction	No TVA is True for all statements
Logically Equivalent	All TVAs same for all statements

Argument	
Valid	Every TVAs with all premises true has conclusion true
Invalid	At least one TVA has all premise true and conclusion false

2 Syntax

Official Notation	( ) around EVERY binary no ( ) around unary
Informal Notation	( ) around some binary no ( ) around unary
Not-well-formed	having different meanings or doesn't have meaning

3 Quantifiers

$\forall x, Ax \to Bx$	Negation	$\exists x, Ax \wedge \neg Bx$
A is B	$\longleftrightarrow$	Some A are not B
All A are B		Not all A are B

$\exists x, Ax \wedge Bx$		$\forall x, Ax \to \neg Bx$
Some A are B	Negation	No A are B
At least one A is B	$\longleftrightarrow$	A are not B
There is an A that is a B		None of A are B

4 Symbolization

Unless = If not = Or

Unless A, B	$\iff$	$(\neg A \to B) \iff (A \vee B)$
A, unless B	$\iff$	$(\neg B \to A) \iff (A \vee B)$

Sufficient / Necessary

A is sufficient for B	$\iff$	$(A \to B)$
A is necessary for B	$\iff$	$(B \to A)$

Only if = Then

Only if A, B	$\iff$	$(B \to A)$
A, only if B	$\iff$	$(A \to B)$

5 Multi Place Symbolization

Only (a is the only F)
Fx $\iff$ x = a

Best (a is the best F)
(Fx and x $\neq$ a) $\to$ (a is better than x)

All except (All F's are G expect a)
(Fx and x $\neq$ a) $\to$ Gx

At least (At least n F's)
$n = 1$: $\exists$x s.t. Fx
$n = 2$: $\exists$x s.t. Fx, and $\exists$y s.t. (y $\neq$ x $\wedge$ Fy)
$n = 3$: $\exists$x s.t. Fx, and $\exists$y s.t. (y $\neq$ x $\wedge$ Fy), and $\exists$z s.t. (z $\neq$ x $\wedge$ z $\neq$ y $\wedge$ Fz) ...

At most (At most n F's)
$\iff \neg$ (At least $n + 1$ F's)

Exactly one (Exactly one F)
$\exists$x s.t. Fx, and $\forall$y (Fy $\to$ x=y)