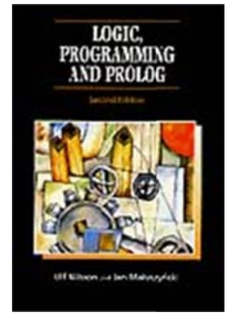
Notation in Nilsson



Conventions seen in Chapter 1 and Appendix B of: Nilsson, Ulf and Małuszyński, *Logic, Programming and Prolog (2ed)*. http://www.ida.liu.se/~ulfni/lpp/

Roman alphabet

Description	Examples	typical use
lowercase italic letters	*a, b, c*	constants
	f, g, h	functors
	p, q, r	predicates
	s, t	terms
uppercase italic letters	*F, G*	formula
	P	set of premises (formulas)
	S, T	sets (of terms)
	X, Y, Z	variables
script capitals	$\mathcal{A}$	alphabet
	$\mathcal{T}$	set of terms
	$\mathcal{F}$	set of (well-formed) functions
	$\mathcal{D}$	domain
Fraktur/black-letter capitals	$\mathfrak{I}$	interpretation
	$\lvert\mathfrak{I}\rvert$	domain
double-struck capitals	$\mathbb{N}$	Set of natural numbers
	$\mathbb{Z}$, $\mathbb{Q}$, $\mathbb{R}$	Sets of integers, rationals, reals

Usage of italic and script letters can be arbitrary and inconsistent; they can be reassigned as convenient. Meanings of double-struck and fraktur letters are fairly standard and well-defined.

Greek alphabet

Arial	Cambria	Symbol	CMMI	Letter name	Usage
φ	φ	φ	φ	phi	a valuation
θ	θ	θ	θ	theta	a substitution
σ	σ	σ	σ	sigma	a substitution; a valuation
γ	γ	γ	γ	gamma	a substitution
δ	δ	δ	δ	delta	a substitution
ε	ε	ε	ϵ	epsilon	the empty substitution

Different fonts can have confusingly different designs for Greek letters (at least, to my Roman-accustomed eyes). The typography in Nilsson uses "italic" forms of the Greek letters from Donald Knuth's Computer Modern font series (CMMI). For example, φ ("phi") tilts to the right and squishes a bit, becoming φ. (Greek typography doesn't have true italics; instead, these seem to approximate handwritten forms.)

Symbols

Glyph	Concept name	Example	Notes
Quantifiers			
$\forall$	universal quantifier	$\forall X$	"for all" or "for every"
$\exists$	existential quantifier	$\exists X$	"there exists some"
Logical connectives			
$\wedge$	conjunction	$x \wedge y$	"and"
$\vee$	disjunction	$x \vee y$	"or"
$\neg$	negation	$\neg x$	"not"
$\supset$	implication	$F \supset G$	"if… then…" (if F then G)
$\leftarrow$	implication	$G \leftarrow F$	"if… then…" (if F then G)
$\leftrightarrow$	equivalence		"if and only if" ("**iff**")
$\equiv$	logical equivalence	$\neg\neg F \equiv F$	"is logically equivalent to"
$\vdash$	derivability	$P \vdash F$	"derives" or "F is derivable from P"
Sets			
$\in$	belonging	$x \in S$	"x is in S" or "x is an element of S"
$\subseteq$	subset (improper)		"subset of or equal to"
$\cup$	union	$S \cup T$	elements found in either
$\cap$	intersection	$S \cap T$	elements found in both
$\times$	Cartesian product	$\mathcal{D} \times \mathcal{D}$	
$\emptyset$	empty set		
$\{\ \ \}$	set construction	$\{\langle \text{Adam} \rangle, \langle \text{Eve} \rangle\}$	
$\langle\ \ \rangle$	(angle brackets)	$p_{\mathfrak{I}} \coloneqq \{\langle \text{Eve} \rangle\}$	*denotes individual vs. symbol?*
Miscellaneous			
$\mid$	condition		"such that"
$\circ$	composition	$F \circ G$	
$/$	arity	p/n	
$/$	mapping (substitution)	$X/t \in \theta$	
$\frac{premises}{conclusion}$	predicate logic notation	$\frac{F \quad F \supset G}{G}$	"if F and F implies G, then G"
$:=$	denotation, assignment	$zero := 0$	"*zero* denotes the number 0"
$\mapsto$	mapping (valuation)	$\varphi[X \mapsto t]$	
$\vDash$	truth	$\mathfrak{I} \vDash_{\varphi} Q$	"Q is true with respect to $\mathfrak{I}$ and φ"
$\vDash$	logical consequence	$P \vDash F$	"F is a logical consequence of P"
$\nvDash$	falsity	$\mathfrak{I} \nvDash_{\varphi} Q$	"Q is false with respect to $\mathfrak{I}$ and φ"