Appendix
List of Basic Logic Symbols

Symbol	Name	Explanation	Example
$\Rightarrow$ $\rightarrow$ $\supset$	implies; if … then	A $\Rightarrow$ B is true just in the case that either A is false or B is true, or both $\rightarrow$ and $\supset$ may mean the same as $\Rightarrow$	$x = 2 \Rightarrow x2 = 4$ is true, but $x2 = 4 \Rightarrow x = 2$ is in general false (since x could be -2)
$\Leftrightarrow$ $\equiv$ $\leftrightarrow$	if and only if; iff; means the same as	A $\Leftrightarrow$ B is true just in case either both A and B are false, or both A and B are true	$x + 5 = y + 2 \Leftrightarrow x + 3 = y$
$\neg$ ˜ !	not	The statement $\neg$A is true if and only if A is false A slash placed through another operator is the same as "$\neg$" placed in front	$\neg(\neg$A) $\Leftrightarrow$ A $x \neq y \Leftrightarrow \neg(x = y)$
$\wedge$ • &	and	The statement A $\wedge$ B is true if A and B are both true; else it is false	$n < 4 \wedge n > 2 \Leftrightarrow n = 3$ when n is a natural number
$\vee$ + $\parallel$	or	The statement A $\vee$ B is true if A or B (or both) are true; if both are false, the statement is false	$n \geq 4 \vee n \leq 2 \Leftrightarrow n \neq 3$ when n is a natural number
$\bigoplus$ $\veebar$	xor	The statement A $\bigoplus$ B is true when either A or B, but not both, are true. A $\veebar$ B means the same	($\neg$A) $\bigoplus$ A is always true. A $\bigoplus$ A is always false
$\top$ T 1	top, verum	The statement $\top$ is unconditionally true	A $\Rightarrow \top$ is always true
$\bot$ F 0	bottom, falsum	The statement $\bot$ is unconditionally false	$\bot \Rightarrow$ A is always true
$\forall$ ()	for all; for any; for each	$\forall x$: $P(x)$ or (x) $P(x)$ means $P(x)$ is true for all x	$\forall n \in N$: $n2 \geq n$
$\exists$	there exists	$\exists x$: $P(x)$ means there is at least one x such that $P(x)$ is true	$\exists n \in N$: n is even

(continued)

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(continued)

Symbol	Name	Explanation	Example
$\exists!$	there exists exactly one	$\exists!\ x$: $P(x)$ means there is exactly one x such that $P(x)$ is true	$\exists!\ n \in N$: $n + 5 = 2n$
$:=$ $\equiv$ $:\Leftrightarrow$	is defined as	$x := y$ or $x \equiv y$ means x is defined to be another name for y (but note that $\equiv$ can also mean other things, such as congruence). $P :\Leftrightarrow Q$ means P is defined to be logically equivalent to Q	cosh x := (1/2)(exp x + exp $(-x)$) A XOR B $:\Leftrightarrow$ (A $\vee$ B) $\wedge$ $\neg$(A $\wedge$ B)
$\vdash$	provable	$x \vdash y$ means y is provable from x (in some specified formal system)	A $\rightarrow$ B $\vdash$ $\neg$B $\rightarrow$ $\neg$A
$\vDash$	entails	$x \vDash y$ means x semantically entails y	A $\rightarrow$ B $\vDash$ $\neg$B $\rightarrow$ $\neg$A