Symbols & Logical Syntax in \LaTeX

Lewis Britton

Greek & Hebrew Characters

Alphabetical Letters

A, α	\Alpha, \alpha	Ι, ι	\Iota, \iota	Ρ, ρ, ρ	\Rho, \rho, \varrho
B, β	\Beta, \beta	K, κ, \varkappa	\Kappa, \kappa, \varkappa	Σ , σ , ς	\Sigma, \sigma, \varsigma
Γ, γ	\Gamma, \gamma	$\Lambda,~\lambda$	\Lambda, \lambda	T, τ	\Tau, \tau
$\Delta, \ \delta$	\Delta, \delta	M, μ	\Mu, \mu	Υ , v	\Upsilon, \upsilon
E, ϵ , ε	\Epsilon, \epsilon, \varepsilon	N, ν	\Nu, \nu	Φ, ϕ, φ	\Phi, \phi, \varphi
Z, ζ	\Zeta, \zeta	Ξ, ξ	\Xi, \xi	Χ, χ,	\Chi, \chi
H, η	\Eta, \eta	О, о	\Omicron, \omicron	Ψ, ψ	\Psi, \psi
Θ , θ , ϑ	\Theta, \theta, \vartheta	Π, π, ϖ	\Pi, \pi, \varpi	Ω, ω	\Omega, \omega

Miscellaneous Characters & Punctuation

F	\digamma	C	\complement	_	\angle	3	\Im	G	\Game
×	\aleph	ℓ	\ell	4	\measuredangle	R	∖Re	E	\Finv
コ	\beth	ð	\eth	∢	\sphericalangle	ប	\mho	∂	\partial
٦	\daleth	\hbar	\hbar	$\sqrt{}$	\surd	80	\wp	TM , ©	\trademark, \copyright
ב	\gimel	ħ	\hslash	Ц	\natural	k	\Bbbk	£, \$	\pounds, \\$
\imath	\imath	Т	\top	#	\sharp	Ø	\emptyset	\Diamond , \Diamond	\diamondsuit, \lozenge
J	\jmath	1	\bot	b	\flat	∞	∞	\Diamond	\heartsuit
∇	\nabla	§	\S	Δ	\vartriangle	□, □	\Box, \square	*	\clubsuit
\triangle	\triangle	Ø	\varnothing	▽	\triangledown	♦	\Diamond	^	\spadesuit
A	\blacktriangle		\blacksquare		\diagdown] =	\exists	*	\bigstar
•	\blacktriangledown	•	\blacklozenge	/	\diagup	∄	\nexists		

Text Mode Miscellaneous Characters & Punctuation

ó	\'{o}	ō	\b{o}	ŏ	\v o	Ø, ø	\0, \0	¶	\P	£, \$	$, \$
ò	\'{o}	ò	\.{o}	ó	\d o	Å, å	\AA, \a	§	\S	!, ?	!,?
ö	\"{o}	ó	\d{o}	ô	\r o	Æ,æ	\AE, \ae	†	\dag	., ,	., ,
ô	\^{o}	Q	\c{o}	ő	\H o	ß	\ss	‡	\ddag	٠, ٠	·, ,
õ	\~{o}	ŏ	\u{o}	o	\t o	1	\i	TM , ©	\trademark, \copyright	", "	", ,, or "
ō	\={o}	ő	\H{o}	oo	\t{oo}	1	\i	(R), (R)	\textregistered, \circledR	:, ;	:,;

Basic Math Mode

Alphabets

$XYX \ xyz$	XYZ\ xyz	XYZ xyz	$\mathbf{XYZ} \mathbf{xyz}$	XYZ	\mathbb{XYZ}
XYZ xyz	\mathnormal{XYZ\ xyz}	XYZ xyz	$XYZ\ xyz$	xyz	\mathbf{XYZ}
$XYZ \ xyz$	\mathit{XYZ\ xyz}	XYZ xyz	$XYZ\ xyz$	XY3	XYZ
XYZ xyz	\mathrm{XYZ\ xyz}				

Spacing

		D. C	1.1	. \ 1 \ \ \ [2 - 2 - \ 1 \ \ 1	N 9 (41.1)
xyz	xyz	Default math	abad	a\!b\mspace{-3mu}c\negthinspace d	Neg. 3mu 'thin'
x y z	x\ y\ z	Expanded	dad	a\negmedspace b\mspace{-4mu}c\negmedspace d	Neg. 4mu 'medium'
$\sin x \cos y$	\sin x\cos y	Operator	dad	$\verb a negthickspace b mspace{-5mu}c negthickspace d $	Neg. 5mu 'thick'
$a\ b\ c\ d$	ab\mspace{3mu}c\thinspace d	3mu 'thin'	a b	ab	Width of 'xxx'
$a\ b\ c\ d$	$a\:b\mspace{4mu}c\mspace d$	4mu 'medium'			
$a\ b\ c\ d$	a\;b\mspace{5mu}c\thickspace d	5mu 'thick'			

Math Accents & Constructs

Note that most basic accents can be stacked. For example, $\accepte{acute\{x\}}\$ yields \acute{x} . Or, $\accepte{acute\{x\}}\$ yields \acute{x} .

\acute{x}	\acute{x}	\dot{x}	\dot{x}	\overline{xyz}	\overline{xyz}	$\stackrel{xyz}{\leftarrow}$	\xleftarrow[abc]{xyz}	\sum_{K}	$\operatorname{Voverset}\{K\}_{\sum}$
ù	\grave{x}	\ddot{x}	\ddot{x}	xyz	\underline{xyz}	\xrightarrow{xyz}	\xrightarrow[abc]{xyz}	$\sum_{k=1}$	lem:lem:lem:lem:lem:lem:lem:lem:lem:lem:
						<u>~</u>		n=1	
\bar{x}	\bar{x}	ž	\check{x}	\overrightarrow{xyz}	\overrightarrow{xyz}	xyz	\overbrace{xyz}	\sqrt{x}	\sqrt{x}
\hat{x}	\hat{x}	\vec{x}	\vec{x}	xyz	\overleftarrow{xyz}	xyz	\underbrace{xyz}	$\sqrt[n]{x}$	$\sqrt[n]{x}$
\tilde{x}	\tilde{x}	\widehat{xyz}	\widehat{xyz}	\overrightarrow{xyz}	\overleftrightarrow{xyz}	f, f', f'	f, f', f\prime		
$reve{x}$	\breve{x}	\widetilde{xyz}	\widetilde{xyz}	$\frac{abc}{xyz}$	\frac{abc}{xyz}	$y \sum_{k}^{j}$	$\label{final} $$ \left(y^x \right)_{k^j} \sum_{k^j} \sum_{k^j} \sum_{k^j} \sum_{k^j} \left(y^k \right)_{k^j} $		

Binary Relations

Note that you can produce according negations by either adding the \not command as a prefix or ordinarily by preceding the commands with 'n'. For example, \not= or \neq turns = to \neq . This rule also holds for arrows, which will be seen later.

Standard Relations

<	<	>	>	=	=	\in	\in	∋	\ni or \owns
\leq	$\leq or \leq o$	\geq	\geq or \ge	=	\equiv	⊢	\vdash	-	\dashv
«	\11	>>	\gg	Ė	\doteq		\mid		\parallel
\prec	\prec	>	\succ	~	\sim	$\overline{}$	\smile		\frown
\preceq	\preceq	≽	\succeq	~	\simeq	3	\exists	_	\lnot or \neg
\subset	\subset	\supset	\supset	≈	\approx	=	\models	上	\perp
\subseteq	\subseteq	\supseteq	\supseteq	\simeq	\cong	\simeq	\asymp	\propto	\propto
	\sqsubset		\sqsupset	M	Join	≠	\neq	\forall	\forall
Г	\sasubsetea		\sasupsetea	M	\bowtie	#	\notin	7. \	\prime. \backprime

Additional Relations

<	\lessdot	≽	\gtrdot	\subseteq	\subseteqq		\supseteqq	~	\thicksim
≤	\leqslant	≥	\geqslant	€	\Subset	∍	\Supset	≈	\thickapprox
<	\eqslantless	≽	\eqslantgtr		\sqsubset		\sqsupset	≥	\approxeq
≦	\leqq	\geq	\geqq	∴	\therefore	·:·	\because	~	\backsim
~	\label{liless}	>>>	\gggtr	1	\shotmid	П	\shortparallel	_ ~	\backsimeq
≨	\lessapprox	≳	\gtrapprox		\smallsmile	_	\smallfrown	⊨	\vDash
≶	\lessgtr	≷	\gtrless	⊲	\vartriangleleft	\triangleright	\vartriangleright	-	vdash
≨	\lesseqgtr	≥	\gtreqless	⊴	\trianglelefteq	⊵	\trianglerighteq	⊪	Vvdash
NI/VII/	\lesseqqgtr	\I\\\I\	\gtreqqless	◀	$\blue{blacktriangleleft}$	•	$\blue{blacktriangleright}$	э	\backepsilon
≼	\precurlyeq	≽	\succcurlyeq	÷	\doteqdot or \Doteq	=	\eqcirc	α	\varpropto
\Rightarrow	\curlyeqprec	⋟	\curlyeqsucc	≓	\risingdotseq	≒.	$\fill falling dotseq$	Ŏ	\between
≾	\precsim	≿	\succsim	å	\circeq	≜	\tirangleeq	ф	\pitchfork
≾≋	\precapprox	≅	\succapprox	<u></u>	\bumpeq	≎	\Bumpeq		

Negated Relations

Į.	\nless	I ~	\ -	1 ~	\b	I ¬	\
4	\niess	*	\ngtr	Ş	\subsetneq	⊋	\supsetneq
≨	\lneq	≥	\gneq	⊊	varsubsetneq	⊋	\varsupsetneq
≰	\nleq	≱	\ngeq	⊈	\nsubseteq	≱	\nsupseteq
≰	\nleqslant	¥	\ngeqslant	#U#U#U#	\subsetneqq	⊋	\supsetneqq
≨	\lneqq	≩	\gneqq	⊊	\varsubsetneqq	⊋	\varsupsetneqq
≨	\lvertneqq	≩	\gvertneqq	¥	\nsubseteqq	₽ 0¥0 #	\nsupseteqq
≨≰	\nleqq	≩	\ngeqq	ł	\nmid	#	\nparallel
⋦	\label{lnsim}		\gnsim	ř	\nshortmid	н	\nshortparallel
≨	\lnapprox	≩	\gnapprox	~	\nsim	≇	\ncong
X	\nprec	7	\nsucc	⊬	\nvdash	⊭	\nvDash
≠	\npreceq	⊭	\nsucceq	⊮	\nVdash	⊯	\nVDash
≆	\precneqq	¥	\succneqq	⋪	\n	⋫	\ntriangleright
$\not\supset$	\precnsim	<i>≽</i>	\succnsim	⊉	\n	⊭	\n
7≈	\precnapprox	.∠æ	\succnapprox				

Binary Operators

Standard Operators

+	+	_	-	\ \	\lor or \vee	_ ^	\land or \wedge	⊲	\1hd	\triangleright	\rhd
\pm	\pm	Ŧ	\mp	0	\oplus	Θ	\ominus	⊴	\unlhd	⊵	\unrhd
×	\times		\cdot	0	\odot	0	\oslash	•	\bullet	0	\circ
÷	\div	\	\setminus	8	\otimes	0	\bigcirc	*	\ast	*	\star
\cup	\cup	\cap	\cap	Δ	\bigtriangleup	∇	\bigtriangledown	♦	\diamond	₹	\wr
Ш	\sqcup	П	\sqcap	∣⊲	\triangleleft	⊳	\triangleright	П	\amalg	₩	\uplus

${\bf Additional\ Operators}$

÷	\dotplus		\centerdot	⊞	\boxplus		\boxminus	*	\divideontimes
\bowtie	\ltimes	×	\rtimes	\boxtimes	\boxtimes	⊡	\boxdot	*	\circledast
U	\Cup or \doublecup	M	\Cap or \doublecap	\rightarrow	\leftthreetimes	_ <	\rightthreetimes	0	\circledcirc
$\underline{\vee}$	\veebar	_	\barwedge	Υ	\curlyvee	人	\curlywedge	Θ	\circleddash
=	\doublebaruedge	-	\intercal	\	\cetminus	\	\cmallcatminuc		

Large Operators

\sum	\sum	ſ	\int	ſſſ	$\ilde{\label{limit}}$	\cap	\bigcap	\oplus	\bigoplus	V	bigvee
Π	\prod	∮	\oint	ſſſſ	$\ilde{\text{liiint}}$	U	\bigcup	\otimes	\bigotimes	Λ	\bigwedge
ΙI	\coprod	l ll	\iint			[+]	\bigoplus	\odot	\bigodot	111	\bigsacup

Functions

arccos	\arcoss	csc	\csc	ini lim	\injlim	max	\max	tan	\tan
arccos	(arcoss	CSC	(050	111) 11111	\111J11m	max	\max	Can	\ can
arcsin	\arcsin	deg	\deg	ker	\ker	min	\min	tanh	\tanh
arctan	\arctan	det	\det	lg	\lg	\Pr	\Pr	\varinjlim	\varinjlim
arg	\arg	dim	\dim	lim	\lim	proj lim	\projlim	liḿ	\varprojlim
cos	\cos	exp	\exp	lim inf	\liminf	sec	\sec	lim	\varliminf
\cosh	\cosh	gcd	\gcd	\limsup	\label{limsup}	sin	\sin	$\overline{\lim}$	\varlimsup
cot	\cot	hom	\hom	ln	\ln	sinh	\sinh	226_0^1	$\label{local_property} $$\operatorname{\partorname}_{226}_0^1$$
coth	\co+h	inf	\inf	log	\100	cup	cun		

Delimiters

Note that you can produce according relatively sized symbols by preceding the commands with $\left(\frac{abc}{xyz}\right)$ For example, $\left(\frac{abc}{xyz}\right)$ turns $\left(\frac{abc}{xyz}\right)$ to $\left(\frac{abc}{xyz}\right)$. Sometimes commands can be preceded with '1' or 'r' e.g., $\left(\frac{abc}{xyz}\right)$. Thus, giving the $\left(\frac{abc}{xyz}\right)$ to $\left(\frac{abc}{xyz}\right)$.

Standard Delimiters

(([\lbrack or [(\langle	L	\lfloor	Г	\ulcorner	1	\uparrow
))]	\rbrack or]	>	\rangle	Γ	\lceil	٦	\urcorner	↓	\downarrow
	\vert or	{	\lbrace or $\$	Γ	\lceil	/	/	L	\llcorner	1	\Uparrow
	$\label{eq:vertor} $$ \ensuremath{Vert}$ or $$ \ensuremath{V}$ \ensuremath{E}$ $	}	\rbrace or \}	L	\lfloor	\	\backslash	٦	\rcorner	↓	\Downarrow

Large Delimiters

ι	\lgroup	J \rgroup	_	\lmoustache	_	\rmoustache	\arrowvert	\Arrowvert	\bracevert

Arrows

Standard Arrows

\leftarrow	\leftarrow or \gets	\rightarrow	\rightarrow or \to	←	\Leftarrow	\Rightarrow	\Rightarrow
\leftarrow	\longleftarrow	\longrightarrow	\longrightarrow	⇐=	\Longleftarrow	\implies	\Longrightarrow
\leftrightarrow	\leftrightarrow	\longleftrightarrow	\longlaeftrightarrow	\Leftrightarrow	\Leftrightarrow	\iff	\Longleftrightarrow
\uparrow	\uparrow	↓	\downarrow	↑	\Uparrow	. ↓	\Downarrow
‡	\updownarrow	\mapsto	\mapsto	\$	Updownarrow	\longmapsto	\longmapsto
\leftarrow	\hookleftarrow	\hookrightarrow	\hookrightarrow	\iff	\iff (larger spaces)		
7	\nearrow	>	\searrow	∠	\swarrow		\nwarrow
↔	\nleftarrow	<i>→</i>	\nrightarrow	#	\nLeftarrow	*	\nRightarrow
↔	\nleftrightarrow			₩	\nLeftrightarrow		

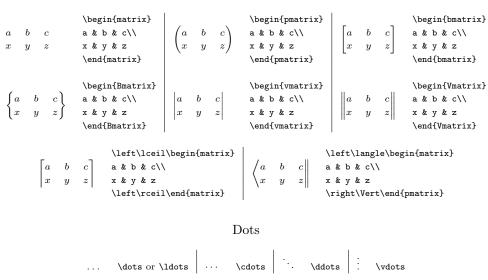
Special Arrows

	\dashleftarrow	→	\dashrightarrow		\leftleftarrows	\Rightarrow	\rightroghtarrows	\leftrightarrows	\leftrightarrows
	\Lleftarrow	\Rightarrow	\Rrightarrow	11	\upuparrows	↓	\downdownarrows	\rightleftharpoons	\rightleftarrows
1	\upharpoonleft	1	\upharpoonright	1	\downharpoonleft	ļ	\downharpoonright	=	\leftrightharpoons
«	\twoheadleftarrow	→	\twoheadrightarrow	←	\leftarrowtail	\rightarrow	\rightarrowtail	\rightleftharpoons	\rightleftharpoons
↰	\Lsh	₽	\Rsh	↔	\looparrowleft	↔	\looparrowright		
\sim	\curvearrowleft	\sim	\curvearrowright	Q	\circlearrowleft	Ö	\circlearrowright		
\sim	\leadsto	~~>	\rightsquigarrow	← ~~→	\leftrightsquigarrow		\multimap		

Matrices & Arrays

Note that any of the following can also be displayed inline as well as stand-alone. It's recommended that you use smallmatrix for this. Thus, you must preced and succeed \begin and \end smallmatrix with \left<delimiter> and \right<delimiter>, respectively. For example, \left(\begin{smallmatrix}a & b & c\\x & y & z\end{smallmatrix}\right) yields $\begin{pmatrix} a & b & c \\ x & y & z \end{pmatrix}$.

Basic Syntax



Array Environment

Note that arrays operate in the same manner as tables such that they permit column alignment 1, c and r etc., columns can be divided using pipes (|) new row lines with $\$, and the use of $\$ to name a few examples. Columns are separated the same as within tables; with (n-1) & ampersand symbols, for n columns. Some simple examples follow.

Relative Font Sizes

Math Mode

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \qquad \text{displaystyle x=\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}} \\ x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \qquad \text{textstyle x=\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}} \\ x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \qquad \text{scriptstyle x=\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}} \\ x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \qquad \text{scriptscriptstyle x=\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}} \\ \text{scriptscriptscriptscriptstyle x=\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}} \\ \text{scriptscriptscriptscriptstyle x=\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}} \\ \text{scriptscriptscriptscriptscriptscriptscriptscriptscriptscriptscriptscriptscriptscriptscriptscriptscriptscriptscrip$$

Text Mode

tiny	\tiny{tiny}	normal	\normalsize{normal}	huge	\huge{huge}
script	\scriptsize{script}	large	\large{large}		
footnote	\footnotesize{footnote}	Large	\Large{Large}	Huge	\Huge{Huge}
small	\small{small}	LARGE	\LARGE{LARGE}		