

# Symbols & Logical Syntax in L<sup>A</sup>T<sub>E</sub>X

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## Greek & Hebrew Letters

Alphabetical Characters					
A, α	\Alpha, \alpha	I, ι	\Iota, \iotaota	P, ρ, ϱ	\Rho, \rho, \varrho
B, β	\Beta, \betaeta	K, κ, ⋈	\Kappa, \kappa, \varkappa	Σ, σ, Ϛ	\Sigma, \sigma, \varsigma
Γ, γ	\Gamma, \gamma	Λ, λ	\Lambda, \lambda	T, τ	\Tau, \tau
Δ, δ	\Delta, \delta	M, μ	\Mu, \mu	Υ, υ	\Upsilon, \upsilon
E, ε, ε	\Epsilon, \epsilon, \varepsilon	N, ν	\Nu, \nu	Φ, φ, ϕ	\Phi, \phi, \varphi
Z, ζ	\Zeta, \zetaeta	Ξ, ξ	\Xi, \xi	X, χ,	\Chi, \chi
H, η	\Eta, \etaeta	O, o	\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

ƒ	\digamma	℄	\complement	ℑ	\Im	⊃	\Game	£	\pounds	.	.
ℵ	\aleph	ℓ	\ell	ℜ	\Re	⋇	\Finv	\$	\\$	,	,
␣	\beth	ð	\eth	ℳ	\mho	∂	\partial	§	\S	‘,	’,
⌈	\daleth	ℏ	\hbar	℘	\wp	™	\trademark	!	!	“,”	“‘,’” or "
⌋	\gimel	ℎ	\hslash	ℓ	\Bbbk	®	\textregistered, \circledR	?	?	:	; \colon or :, ;

## Basic Math Mode Syntax

$XYZ\ xyz$	$XYZ\ xyz$	$XYZ\ xyz$	$\mathrm{XYZ\ xyz}$	$XYZ\ xyz$	$\mathit{XYZ\ xyz}$	$\mathbf{XYZ\ xyz}$	$\mathbb{XYZ\ xyz}$
$\mathbb{XYZ}$	$\mathbb{XYZ}$	$\mathcal{XYZ}$	$\mathcal{XYZ}$	$\mathfrak{XYZ}$	$\mathfrak{XYZ}$	$\mathbf{XYZ}$	$\mathbb{XYZ}$
$xyz$	$xyz$	Math spacing		$\sin x \cos y$	$\sin x \cos y$	Operator spacing	
$x\ y\ z$	$x\ y\ z$	Extended spacing		$a\ b\ c\ d$	$a\,b\mspace{3mu}c\thinspace d$	3mu (‘thin’) space	
$a\ b\ c\ d$	$a\,b\mspace{4mu}c\medspace d$	4mu (‘medium’) space		$a\ b\ c\ d$	$a\,b\mspace{5mu}c\thickspace d$	5mu (‘thick’) space	
$a\ b\ c\ d$	$a\quad b\mspace{18mu}c\quad d$	18mu (‘quad’) space		$d\!d\!$	$a\!b\mspace{-3mu}c\negthinspace d$	Neg. 3mu (‘thin’) space	
$a\ b$	$a\phantom{xxx}b$	Space width of ‘xxx’					

## Math Accents & Constructs

$\hat{x}$	\hat{x}	$\check{x}$	\check{x}	$\tilde{x}$	\tilde{x}	$\acute{x}$	\acute{x}	$\grave{x}$	\grave{x}
$\dot{x}$	\dot{x}	$\ddot{x}$	\ddot{x}	$\breve{x}$	\breve{x}	$\bar{x}$	\bar{x}	$\vec{x}$	\vec{x}
$\widehat{xyz}$	\widehat{xyz}	$\widetilde{xyz}$	\widetilde{xyz}	$\frac{abc}{xyz}$	\frac{abc}{xyz}	$f, f'$	f, f'prime	$\sqrt{x}$	\sqrt{x}
$\sqrt[n]{x}$	\sqrt[n]{x}	$\overline{xyz}$	\overline{xyz}	$\underline{xyz}$	\underline{xyz}	$\overbrace{xyz}$	\overbrace{xyz}	$\underbrace{xyz}$	\underbrace{xyz}
$\overrightarrow{xyz}$	\overrightarrow{xyz}	$\overleftarrow{xyz}$	\overleftarrow{xyz}	$\overleftrightarrow{xyz}$	\overleftrightarrow{xyz}	$\xleftarrow{xyz}$	\xleftarrow{xyz}	$\xrightarrow{xyz}$	\xrightarrow{xyz}
$\sum\limits_y^x$	\sideset{x}{y}{\sum}	$\sum^K$	\overset{K}{\sum}	$\sum_{k=1}$	\underset{k=1}{\sum}				

## 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 `≠`.

$<$	<	$>$	>	$=$	=	$\in$	\in	$\ni$	\ni or \owns
$\leq$	\leq or \le	$\geq$	\geq or \ge	$\equiv$	\equiv	$\vdash$	\vdash	$\dashv$	\dashv
$\ll$	\ll	$\gg$	\gg	$\doteq$	\doteq	$\mid$	\mid	$\parallel$	\parallel
$\prec$	\prec	$\succ$	\succ	$\sim$	\sim	$\smile$	\smile	$\frown$	\frown
$\preceq$	\preceq	$\succeq$	\succeq	$\simeq$	\simeq	$\models$	\models	$\perp$	\perp
$\subset$	\subset	$\supset$	\supset	$\approx$	\approx	$\asymp$	\asymp	$\propto$	\propto
$\subseteq$	\subseteq	$\supseteq$	\supseteq	$\cong$	\cong	$\asymp$	\asymp	$\propto$	\propto
$\subsetneq$	\subsetneq	$\supsetneq$	\supsetneq	$\Join$	\Join	$\neq$	\neq	$\forall$	\forall
$\sqsubset$	\sqsubset	$\sqsupset$	\sqsupset	$\bowtie$	\bowtie	$\notin$	\notin	$\prime$	\prime
$\sqsubseteq$	\sqsubseteq	$\sqsupseteq$	\sqsupseteq						

## Binary Operators

$+$	+	$-$	-	$\vee$	\lor or \vee	$\wedge$	\land or \wedge	$\triangleleft$	\lhd	$\triangleright$	\rhd	$\dagger$	\dagger
$\pm$	\pm	$\mp$	\mp	$\oplus$	\oplus	$\ominus$	\ominus	$\trianglelefteq$	\unlhd	$\trianglerighteq$	\unrhd	$\ddagger$	\ddagger
$\times$	\times	$\cdot$	\cdot	$\odot$	\odot	$\oslash$	\oslash	$\bullet$	\bullet	$\circ$	\circ	$\P$	\P
$\div$	\div	$\setminus$	\setminus	$\otimes$	\otimes	$\bigcirc$	\bigcirc	$\ast$	\ast	$\star$	\star		
$\cup$	\cup	$\cap$	\cap	$\triangleleft$	\triangleleft	$\bigtriangledown$	\bigtriangledown	$\diamond$	\diamond	$\wr$	\wr		
$\sqcup$	\sqcup	$\sqcap$	\sqcap	$\triangleleft$	\triangleleft	$\triangleright$	\triangleright	$\amalg$	\amalg	$\uplus$	\uplus		
		$\sum$	\sum	$\int$	\int	$\bigcap$	\bigcap	$\bigoplus$	\bigoplus	$\bigvee$	\bigvee		
		$\prod$	\prod	$\oint$	\oint	$\bigcup$	\bigcup	$\bigotimes$	\bigotimes	$\bigwedge$	\bigwedge		
		$\coprod$	\coprod	$\iint$	\iint	$\biguplus$	\biguplus	$\bigodot$	\bigodot	$\bigsqcup$	\bigsqcup		

Delimiters

Note that you can produce according relatively sized symbols by preceding the commands with `\left` or `\right`. For example, `\left(\frac{abc}{xyz}\right)` turns  $(\frac{abc}{xyz})$  to  $\left(\frac{abc}{xyz}\right)$ . Sometimes commands can be preceded with ‘l’ or ‘r’ e.g., `\lVert xyz\rVert` makes  $\|xyz\|$ . Thus, giving the `\Vert` command properties of paired symbols.

(	(	[	\lbrack or [	<	\langle	⌊	\lfloor	⌞	\ulcorner	↑	\uparrow
)	)	]	\rbrack or ]	>	\rangle	⌋	\lceil	⌟	\urcorner	↓	\downarrow
	\vert or	{	\lbrace or \{	⌈	\lceil	/	/	⌌	\llcorner	↗	\Uparrow
	\Vert or \lVert	}	\rbrace or \}	⌋	\lfloor	\	\backslash	⌝	\rcorner	↘	\Downarrow

Arrows

←	\leftarrow or \gets	→	\rightarrow or \to	⇐	\Leftarrow	⇒	\Rightarrow
⇐	\longleftarrow	→	\longrightarrow	⇐	\Longleftarrow	⇒	\Longrightarrow
↔	\leftrightharpoonup	↔	\longlleftrightharpoonup	↔	\Leftrightharpoonup	↔	\Longleftrightharpoonup
↑	\uparrow	↓	\downarrow	↑	\Uparrow	↓	\Downarrow
↕	\updownarrow	↦	\mapsto	↕	\Updownarrow	↦	\longmapsto
↵	\hookleftarrow	↵	\hookrightarrow	⇔	\iff (larger spaces)		
↗	\nearrow	↘	\searrow	↙	\swarrow	↖	\nwarrow

↔	\dashleftarrow	↔	\dashrightarrow	⇌	\leftrightarrows	⇌	\righttroghtarrows	⇌	\leftrightharrows
⇌	\Lleftarrow	⇌	\Rrightarrow	⇌	\upuparrows	⇌	\downdownarrows	⇌	\rightleftarrows
↗	\upharpoonleft	↘	\upharpoonright	↘	\downharpoonleft	↗	\downharpoonright	⇌	\leftrightharpoons
↔	\twoheadleftarrow	↔	\twoheadrightarrow	↔	\leftarrowtail	↔	\rightarrowtail	⇌	\rightleftharpoons
↗	\Lsh	↘	\Rsh	↗	\looparrowleft	↘	\looparrowright		
↗	\curvearrowleft	↘	\curvearrowright	↗	\circlearrowleft	↘	\circlearrowright		
↗	\leadsto	↗	\rightsquigarrow	↗	\leftrightsquigarrow	↗	\multimap		