# IATEX Mathematical Symbols

The more unusual symbols are not defined in base LATEX (NFSS) and require \usepackage{amssymb}

#### 1 Greek and Hebrew letters

$\alpha$	\alpha	K	\kappa	W	\psi	F	\digamma	$\Delta$	\Delta	Θ	\Theta
B	\beta	$\lambda$	\lambda	P	\rho	ε	\varepsilon	Γ	\Gamma	Υ	\Upsilon
X	\chi	$\mu$	\mu	$\sigma$	\sigma	×	\varkappa	Λ	\Lambda	Ξ	\Xi
δ	\delta	$\nu$	\nu	$\tau$	\tau	$\varphi$	\varphi	Ω	\Omega		
$\epsilon$	\epsilon	0	0	$\theta$	\theta	$\overline{w}$	\varpi	Φ	\Phi	X	\aleph
η	\eta	w	\omega	v	\upsilon	P	\varrho	П	\Pi		\beth
2	\gamma	φ	\phi	ξ	\xi	5	\varsigma	$\Psi$	\Psi	٦	\daleth
ı	\iota	$\pi$	\pi	5	\zeta	v	\vartheta	$\Sigma$	\Sigma	I	\gimel

### 2 LATEX math constructs

$\frac{abc}{xyz}$	\frac{abc}{xyz}	$\overline{abc}$	\overline{abc}	$\overrightarrow{abc}$	\overrightarrow{abc}
f'	f'	abc	\underline{abc}	$\overrightarrow{abc}$	$\verb \overleftarrow  \{abc\} $
$\sqrt{abc}$	\sqrt{abc}	$\widehat{abc}$	\widehat{abc}	$\widehat{abc}$	\overbrace{abc}
$\sqrt[n]{abc}$	\sqrt[n] {abc}	$\widetilde{abc}$		abc	$\underbrace{abc}$

#### 3 Delimiters

1	1	} \{	1	\lfloor	1	1	1	\Uparrow	L	\llcorner
1	\vert	} \}	1	\rfloor	1	\backslash	1	\uparrow	J	\lrcorner
-	M	( \langle	ſ	\lceil	[	[	#	\Downarrow	Г	\ulcorner
II	\Vert	) \rangle	1	\rceil	1	]	1	\downarrow	٦	\urcorner

Use the pair  $\ \left| \text{left} s_1 \right| = \ \left| \text{left} s_2 \right| = \ \left| \text{left} \right| = \ \left| \text{$ 

### 4 Variable-sized symbols (displayed formulae show larger version)

$\Sigma$	\sum	ſ	\int	$\forall$	\biguplus	$\oplus$	\bigoplus	V	\bigvee
П	\prod	∮	\oint	$\cap$	\bigcap	$\otimes$	\bigotimes	Λ	\bigwedge
П	\coprod	JJ	\iint	U	\bigcup	0	\bigodot		\bigsqcup

#### 5 Standard Function Names

Function names	should appear	in Roman, n	Incor		$tan(at-n\pi) \longrightarrow tan(at-n\pi)$ $tan(at-n\pi) \longrightarrow tan(at-n\pi)$		
arccos	\arccos	arcsin	\arcsin	arctan	\arctan	arg	\arg
cos	\cos	cosh	\cosh	cot	\cot	coth	\coth
csc	\csc	deg	\deg	det	\det	dim	\dim
exp	\exp	gcd	\gcd	hom	\hom	inf	\inf
ker	\ker	lg	\lg	lim	\lim	lim inf	\liminf
$\lim \sup$	\limsup	ln	\ln	log	\log	max	\max
min	\min	Pr	\Pr	sec	\sec	sin	\sin
sinh	\sinh	sun	\sun	tan	\tan	tanh	\tanh

## 6 Binary Operation/Relation Symbols

*	\ast	$\pm$	\pm	$\cap$	\cap	⊲	\lhd
*	\star	<b>Ŧ</b>	\mp	U	\cup	D	\rhd
	\cdot	П	\amalg	$\oplus$	\uplus	⊲	\triangleleft
0	\circ	0	\odot	П	\sqcap	D	\triangleright
	\bullet	0	\ominus	L	\sqcup	⊴	\unlhd
0	\bigcirc	0	\oplus	Λ	\wedge	₽	\unrhd
0	\diamond	0	\oslash	V	\vee	$\nabla$	\bigtriangledown
×	\times	8	\otimes	t	\dagger	Δ	\bigtriangleup
÷	\div	2	\wr	İ	\ddagger	1	\setminus
	\centerdot		\Box	7	\barwedge	Y	\veebar
•	\circledast	Œ	\boxplus		\curlywedge	Y	\curlyvee
0	\circledcirc	В	\boxminus	m	\Cap	U	\Cup
Θ	\circleddash	×	\boxtimes	1	\bot	Т	\top
+	\dotplus	<u> </u>	\boxdot	Т	\intercal	1	\rightthreetimes
*	\divideontimes		\square	<u>+</u>	\doublebarwedge	X	\leftthreetimes
*	/divideoutimes	_	/square	^	/dodnienai wedke	^	/Ielcouraecimes
$\equiv$	\equiv	$\leq$	\leq	$\geq$	\geq	1	\perp
$\cong$	\cong	$\prec$	\prec	>	\succ	1	\mid
$\neq$	\neq	$\preceq$	\preceq	$\succeq$	\succeq		\parallel
~	\sim	«	\11	>>	\gg	M	\bowtie
$\simeq$	\simeq	C	\subset	)	\supset	M	\Join
$\approx$	\approx	$\subseteq$	\subseteq	⊇	\supseteq	×	\ltimes
$\times$	\asymp		\sqsubset		\sqsupset	×	\rtimes
$\dot{=}$	\doteq	$\sqsubseteq$	\sqsubseteq	$\supseteq$	\sqsupseteq	-	\smile
$\propto$	\propto	7	\dashv	F	\vdash	_	\frown
=	\models	$\in$	\in	€	\ni	∉	\notin
~	Vanneavag	<	11000	>	\	-	\langety
~	\approxeq \thicksim	$\leq$	\leqq	$\geq$	\geqq	3	\lessgtr
~		<	\leqslant	>	\geqslant	AVIAW	\lesseqgtr
~	\backsim	≨	\lessapprox	≈	\gtrapprox		\lesseqqgtr
~	\backsimeq	≪	\111	>>>	\ggg	AIVAIIVVII	\gtreqqless
$\triangleq$	\triangleq	<	\lessdot	>	\gtrdot	$\geq$	\gtreqless
=	\circeq	$\lesssim$	\lesssim	$\gtrsim$	\gtrsim	2	\gtrless
$\simeq$	\bumpeq	1	\eqslantless	>	\eqslantgtr	•	\backepsilon
-	\Bumpeq	$\preceq$	\precsim	$\succeq$	\succsim	Ŏ	\between
÷	\doteqdot	M &X≀≀	\precapprox	WRYZY	\succapprox	ψ	\pitchfork
~	\thickapprox	@	\Subset	€	\Supset	1	\shortmid
=	\fallingdotseq	$\subseteq$	\subseteqq	$\supseteq$	\supseteqq	-	\smallfrown
=	\risingdotseq		\sqsubset	$\equiv$	\sqsupset	-	\smallsmile
oc	\varpropto	*	\preccurlyeq	>	\succcurlyeq	11-	\Vdash
	\therefore	4	\curlyeqprec	>	\curlyeqsucc	<b>=</b>	\vDash
	\because	4	\blacktriangleleft	-	\blacktriangleright	111-	\Vvdash
300	\eqcirc	⊴	\trianglelefteq	≥	\trianglerighteq	311	\shortparallel
$\neq$	\neq	abla	\vartriangleleft	D	\vartriangleright	H	\nshortparallel
100	D•127000 1000		5		9884 L.T.L.		
7	\ncong	X X X X	\nleq	***	\ngeq	¥	\nsubseteq
1	\nmid	#	\nleqq	#	\ngeqq	¥¥¥¥	\nsupseteq
ł	\nparallel		\nleqslant	7	\ngeqslant	¥	\nsubseteqq
4	\nshortmid	×	\nless	7	\ngtr	£	\nsupseteqq
H	\nshortparallel	x	\nprec	7	\nsucc	⊊	\subsetneq
~	\nsim	L	\npreceq	$ \not\equiv $	\nsucceq	$\stackrel{>}{\supseteq}$	\supsetneq
¥	\nVDash	≈	\precnapprox	≈	\succnapprox	¥	\subsetneqq
×	\nvDash	*	\precnsim	The	\succnsim	3	\supsetneqq
¥	\nvdash	≨	\lnapprox	≥	\gnapprox	ç	\varsubsetneq
Ø	\ntriangleleft	MAKARARAKA	\lneq	2	\gneq	SON TO SON TO SON	\varsupsetneq
⊅	\ntrianglelefteq	≨	\lneqq	≩	\gneqq	¥	\varsubsetneqq
DX.	\ntriangleright	<b>√</b> 2√#	\lnsim	#V&V#V*Y#Y	\gnsim	7	\varsupsetneqq
学	\ntrianglerighteq	≨	\lvertneqq	≩	\gvertneqq	4050	

### 7 Arrow symbols

+	\leftarrow	←	\longleftarrow	1	\uparrow
=	\Leftarrow	←=	\Longleftarrow	1	\Uparrow
$\longrightarrow$	\rightarrow	$\longrightarrow$	\longrightarrow	1	\downarrow
$\Rightarrow$	\Rightarrow	$\Longrightarrow$	\Longrightarrow	1	\Downarrow
$ \longleftrightarrow $	\leftrightarrow	·	\longleftrightarrow	1	\updownarrow
$\Leftrightarrow$	\Leftrightarrow	$\iff$	\Longleftrightarrow	1	\Updownarrow
$\longmapsto$	\mapsto	$\longmapsto$	\longmapsto	1	\nearrow
$\leftarrow$	\hookleftarrow	$\hookrightarrow$	\hookrightarrow	1	\searrow
_	\leftharpoonup	$\rightarrow$	\rightharpoonup	/	\swarrow
~	\leftharpoondown	$\rightarrow$	\rightharpoondown	1	\nwarrow
<del></del>	\rightleftharpoons	~~	\leadsto		
+	\dashrightarrow	4	\dashleftarrow	=	\leftleftarrows
$\Longrightarrow$	\leftrightarrows	€	\Lleftarrow		\twoheadleftarrow
$\leftarrow$	\leftarrowtail	<b>←P</b>	\looparrowleft	<del></del>	\leftrightharpoons
5	\curvearrowleft	0	\circlearrowleft	7	\Lsh
11	\upuparrows	1	\upharpoonleft	1	\downharpoonleft
-0	\multimap	****	\leftrightsquigarrow	$\Rightarrow$	\rightrightarrows
$\rightleftharpoons$	\rightleftarrows	$\Rightarrow$	\rightrightarrows	$\Rightarrow$	\rightleftarrows
	\twoheadrightarrow	$\rightarrow$	\rightarrowtail	9	\looparrowright
$\Longrightarrow$	\rightleftharpoons	~	\curvearrowright	O	\circlearrowright
1,	\Rsh	11	\downdownarrows	1	\upharpoonright
1	\downharpoonright	~~	\rightsquigarrow		
+-	\nleftarrow		\nrightarrow	<b>#</b>	\nLeftarrow
$\Rightarrow$	\nRightarrow	650	\nleftrightarrow	<⇒	\nLeftrightarrow

### 8 Miscellaneous symbols

\inftv	A	\forall	k	\Bbbk	0	\wp
\nabla	3	\exists	*	20070	2	\angle
\partial	∄	\nexists	1		4	\measuredangle
\eth	Ø		/			\sphericalangle
\clubsuit	Ø		0	\Diamond	C	\complement
\diamondsuit	1	\imath	F	\Finv	$\nabla$	\triangledown
\heartsuit	2	\jmath	0	\Game	Δ	\triangle
\spadesuit	l	\ell	ħ	\hbar	Δ	\vartriangle
\cdots	$\iiint$	\iiiint	$\hbar$	\hslash		\blacklozenge
\vdots	III	\iiint	0	\lozenge		\blacksquare
\ldots	ĬĬ	\iint	Ü	\mho	•	\blacktriangle
\ddots		\sharp	,	\prime	•	\blacktrinagledown
\Im	ь	\flat		\square	1	\backprime
\Re	р	\natural	$\checkmark$	\surd	S	\circledS
	\partial \eth \clubsuit \diamondsuit \heartsuit \spadesuit \cdots \vdots \ldots \ddots \ddots \Im	\nabla	\nabla       ∃       \exists         \partial       ∄       \nexists         \eth       ∅       \emptyset         \clubsuit       ∅       \varnothing         \diamondsuit       i       \imath         \heartsuit       j       \jmath         \spadesuit       ℓ       \ell         \cdots       ∫∫       \iiiint         \vdots       ∫∫       \iiint         \ddots       ‡       \sharp         \Im       ♭       \flat	\nabla	\text{\partial}	\nabla       ∃       \exists       ★       \bigstar       ∠         \partial       ∄       \nexists       \diagdown       ∠         \eth       ∅       \emptyset       / \diagup       ∠         \clubsuit       ∅       \varnothing       ♦       \Diamond       C         \diamondsuit       i       \imath       ∃       \Finv       ♥         \heartsuit       j       \jmath       ∃       \Game       △         \kappadesuit       lell       h       \hbar       ♠         \kappadesuit       lell       h       \hbar       \hbar     <

### 9 Math mode accents

$\dot{a}$	$\acute{a}$	$\bar{a}$	\bar{a}	Á	\Acute{\Acute{A}}	Ā	\Bar{\Bar{A}}
$\check{a}$	\breve{a}	$\check{a}$	$\check{a}$	Å	\Breve{\Breve{A}}	Å	\Check{\Check{A}}
$\ddot{a}$	$\dot{a}$	$\dot{a}$	$\det\{a\}$	Ä	\Ddot{\Ddot{A}}	À	\Dot{\Dot{A}}
à	\grave{a}	$\hat{a}$	$\hat{a}$	À	\Grave{\Grave{A}}	Â	\Hat{\Hat{A}}
$\tilde{a}$	$\hat{a}$	$\vec{a}$	$\sqrt{a}$	$\tilde{ ilde{A}}$	$Tilde{Tilde{A}}$	$\vec{\tilde{A}}$	\Vec{\Vec{A}}

### 10 Array environment, examples

Simplest version:  $\begin{array}{cols} row_1 \setminus row_2 \setminus \dots row_m \end{array}$  where cols includes one character [1rc] for each column (with optional characters | inserted for vertical lines) and  $row_i$  includes character & a total of (n-1) times to separate the n elements in the row. Examples:

$$\left( \begin{array}{cc} 2\tau & 7\phi - \frac{5}{12} \\ 3\psi & \frac{\pi}{8} \end{array} \right) \left( \begin{array}{c} x \\ y \end{array} \right) \text{ and } \left[ \begin{array}{cc} 3 & 4 & 5 \\ 1 & 3 & 729 \end{array} \right]$$

 $f(z) = \left\{ \left( \left( \frac{z^2}{\cos z} & \mbox{for} \right) \\ \left( \left( \frac{z^2}{\cos z} \right) & \mbox{for} \right) \\ \left( \frac{z}{3} \right) & \mbox{for} & 3\left( \frac{z}{\log z} \right) \\ \left( \frac{z}{3} \right) \\ \left( \frac{z}{3} \right) & \mbox{for} & |z| > 5 \\ \left( \frac{z}{3} \right) \\ \left( \frac{z}{3} \right) & \mbox{for} \\ \left( \frac{z}{3} \right)$ 

$$f(z) = \begin{cases} \overline{z^2 + \cos z} & \text{for } |z| < 3\\ 0 & \text{for } 3 \le |z| \le 5\\ \sin \overline{z} & \text{for } |z| > 5 \end{cases}$$

### 11 Other Styles (math mode only)

Caligraphic letters: \$\mathcal{A}\$ etc.: ABCDEFGHIJKLMNOPQRSTUVWXYZ

Mathbb letters: \$\mathbb{A}\\$ etc.: ABCDEFGHIJKLMNOPQRSTUVWXYZ

Mathfrak letters: \$\mathfrak{A}\$ etc.: ABCDEFGSJJRLMNOPQRSTUVWXY3abc123

Math Sans serif letters: \$\mathsf{A}\\$ etc.: ABCDEFGHIJKLMNOPQRSTUVWXYZabc123

Math bold letters: \$\mathbf{A}\\$ etc.: ABCDEFGHIJKLMNOPQRSTUVWXYZabc123

Math bold italic letters: define \def\mathbi#1{\textbf{\em #1}} then use  $\mathcal{A}BCDEFGHIJKLMNOPQRSTUVWXYZ$  abc 123

#### 12 Font sizes

Math Mode:  $\int f^{-1}(x - x_a) dx$   $\int f^{-1}(x - x_a) dx$   $\int f^{-1}(x - x_a) dx$   $\int f^{-1}(x - x_a) dx$ 

 ${\sigma^{-1}(x-x_a)\,dx}$ 

) dx \${\textstyle \int f^{-1}(x-x\_a)\,dx}\$

 ${\left(x-x_a\right),dx}$  ${\left(x-x_a\right),dx}$ 

Text Mode:

\tiny = smallest \scriptsize = very small \footnotesize = smaller \small = small \large = large \Large = Large \Large = LARGE

 $\begin{array}{l} \text{huge} = huge \\ \text{Huge} = Huge \end{array}$ 

### 13 Text Mode: Accents and Symbols

6 \'{0} 1^{0} 1'(0) \"{0} ō \~{o} ō \={o} \d s ő \H{o} o \d{o} ó \.{o} \u{o} 00 \t{00} Q \c{o} s \r s ŏ \b{o} \AA å \aa ß \ss 1 \i J \j š \H s s \t s š \v s Ø \0 \P \S 10 Ø Æ \AE £ \pounds \ae † \dag \ddag © \copyright