# List of Mathematical Symbols

In the following tables, you find all the symbols normally accessible from  $math\ mode.$ 

To use the symbols listed in Table, <sup>6</sup> the package amssymb must be loaded in the preamble of the document and the AMS math fonts must be installed, on the system. If the AMS package and fonts are not installed, on your system, have a look at

CTAN:/tex-archive/macros/latex/packages/amslatex

#### Math Mode Accents.

$\hat{a}$	$\hat{a}$	$\check{a}$	$\check{a}$	$\tilde{a}$	$\tilde{a}$	$\acute{a}$	$\acute{a}$
$\grave{a}$	\grave{a}	$\dot{a}$	$\det\{a\}$	$\ddot{a}$	$\dot{a}$	$reve{a}$	\breve{a}
$\bar{a}$	\bar{a}	$\vec{a}$	\vec{a}	$\widehat{A}$	\widehat{A}	$\widetilde{A}$	\widetilde{A}

#### Lowercase Greek Letters.

$\alpha$	\alpha	$\theta$	\theta	o	0	v	\upsilon
$\beta$	\beta	$\vartheta$	\vartheta	$\pi$	\pi	$\phi$	\phi
$\gamma$	\gamma	$\iota$	\iota	$\varpi$	\varpi	$\varphi$	\varphi
$\delta$	\delta	$\kappa$	\kappa	$\rho$	\rho	$\chi$	\chi
$\epsilon$	\epsilon	$\lambda$	\lambda	$\varrho$	\varrho	$\psi$	\psi
$\varepsilon$	$\vert varepsilon$	$\mu$	\mu	$\sigma$	\sigma	$\omega$	\omega
$\zeta$	\zeta	$\nu$	\nu	ς	\varsigma		
$\eta$	\eta	ξ	\xi	au	\tau		

#### Uppercase Greek Letters.

Γ	\Gamma	$\Lambda$	$\Lambda$	$\sum$	\Sigma	$\Psi$	\Psi
$\Delta$	\Delta	Ξ	\Xi	Υ	\Upsilon	$\Omega$	\Omega
Θ	\Theta	Π	\Pi	Φ	\Phi		

#### Binary Relations.

You can produce corresponding negations by adding a \not command as prefix to the following symbols.

```
<
<
\leq
    \leq or \leq o
                      \geq
                           \geq or \ge
                                             \equiv
                                                  \equiv
≪ \11
                                             \doteq
                                                  \doteq
                      \gg
                           \gg
\prec
   \prec
                           \succ
                                                  \sim
\succeq
                                                  \simeq
                                             \simeq
\supset
                                                  \approx
                           \supset
                                             \approx
\subseteq
                       \supseteq
                                             \cong
    \subseteq
                           \supseteq
                                                  \cong
\slashsqsubset ^a
                      \sqsupset ^a
                                             \bowtie
                                                  \ Join ^a
\sqsubseteq
    \sqsubseteq
                      \Box
                           \sqsupseteq
                                                 \bowtie
                                             \bowtie
    \in
                           \ni , \owns
                                                  \propto
\in
                       \ni
                                             \propto
    \vdash
                           \dashv
                                             \models
                                                  \models
    \mid
                       \parallel
                                             \perp
                                                  \perp
    \smile
                           \frown
                                             \asymp
                                                  \asymp
    :
                           \notin
                                             \neq
                                                  \neq or \neq
```

## Binary Operators.

+	+	_	_		
$\pm$	\pm	干	\mp	◁	$\triangleleft$
•	\cdot	÷	\div	$\triangleright$	\triangleright
×	\times	\	\setminus	*	\star
$\cup$	\cup	$\cap$	\cap	*	\ast
Ц	\sqcup	П	\sqcap	0	\circ
$\vee$	$\ve$ , $\lor$	$\wedge$	\wedge , \land	•	\bullet
$\oplus$	\oplus	$\ominus$	\ominus	$\Diamond$	\diamond
$\odot$	\odot	$\oslash$	\oslash	$\forall$	\uplus
$\otimes$	\otimes	$\bigcirc$	\bigcirc	П	\amalg
$\triangle$	$\$ bigtriangleup	$\nabla$	\bigtriangledown	†	\dagger
$\triangleleft$	$\backslash$ lhd $^a$	$\triangleright$	$\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ $	‡	\ddagger
$\leq$	\unlhd $^a$	$\trianglerighteq$	\unrhd $^a$	}	\wr

 $<sup>^</sup>a\mathrm{Use}$  the latex sym package to access this symbol

#### BIG Operators. \sum \bigcup \bigvee \bigoplus \prod \bigwedge \bigotimes П \bigcap $\otimes$ \coprod \bigsqcup \bigodot П $\odot$ \int \oint \biguplus Arrows. \leftarrow or \gets \longleftarrow \uparrow \rightarrow or \to \longrightarrow \downarrow \leftrightarrow \longleftrightarrow \updownarrow \Leftarrow \Longleftarrow $\uparrow$ \Uparrow $\Leftarrow$ \Rightarrow \Longrightarrow $\Downarrow$ \Downarrow \Leftrightarrow \Longleftrightarrow 1 \Updownarrow \mapsto \longmapsto \nearrow \hookrightarrow \hookleftarrow $\hookrightarrow$ \searrow \leftharpoonup \rightharpoonup \swarrow \leftharpoondown \rightharpoondown \nwarrow \rightleftharpoons $\iff$ \iff (bigger spaces) $\label{leadsto} ^a$ <sup>a</sup>Use the latexsym package to access this symbol Delimiters. ( ) \uparrow \Uparrow [ or \lbrack ] or \rbrack \downarrow \Downarrow \{ or \lbrace \} or \rbrace \updownarrow \Updownarrow | or \vert \| or \Vert \langle \rangle \lfloor \rfloor \lceil \rceil \backslash . (dual. empty) Large Delimiters.

\lmoustache

\bracevert

\rmoustache

 $\Leftarrow$ 

 $\Leftrightarrow$ 

\lgroup

\arrowvert

\rgroup \Arrowvert

## Miscellaneous Symbols.

	\dots		\cdots	:	\vdots	٠.	\ddots
$\hbar$	\hbar	$\imath$	$\$ imath	Ĵ	$\$ jmath	$\ell$	\ell
$\Re$	\Re	$\Im$	\Im	×	\aleph	60	\wp
$\forall$	\forall	$\exists$	\exists	Ω	\mho $^a$	$\partial$	\partial
′	,	1	\prime	Ø	\emptyset	$\infty$	$\infty$
$\nabla$	\nabla	$\triangle$	$\$ triangle		$\operatorname{ackbox}^a$	$\Diamond$	$\$ Diamond $^a$
$\perp$	\bot	Т	\top	_	\angle	$\sqrt{}$	\surd
$\Diamond$	$\diamondsuit$	$\Diamond$	\heartsuit	4	\clubsuit	•	\spadesuit
$\neg$	$\  \   \   \   \   \   \   \   $	þ	\flat	þ	\natural	#	\sharp

 $<sup>^</sup>a\mathrm{Use}$  the latex sym package to access this symbol

# Non-Mathematical Symbols.

These symbols can also be used in text mode.

# AMS Delimiters.

「 \ulcorner ¬ \urcorner ∟ \llcorner 」 \lrcorner

## AMS Greek and Hebrew.

 $\digamma$  \digamma  $\varkappa$  \varkappa  $\beth$  \beth  $\gimel$  \daleth  $\gimel$  \gimel

# AMS Binary Relations.

			·		
<	\lessdot	>	\gtrdot	$\doteq$	\doteqdot or \Doteq
$\leq$	\leqslant	$\geqslant$	\geqslant	≓	$\rightarrow$ risingdotseq
<	\eqslantless	$\geqslant$	\eqslantgtr	=	$\fill falling dots eq$
$\leq$	\leqq	$\geq$	\geqq	<u> </u>	\eqcirc
<b>///</b>	$\label{liless}$	<b>&gt;&gt;&gt;</b>	\ggg or \gggtr	<u>•</u>	\circeq
$\lesssim$	\lesssim	$\gtrsim$	\gtrsim	$\stackrel{\triangle}{=}$	\triangleq
$\lessapprox$	\lessapprox	$\gtrapprox$	\gtrapprox	<u>~</u>	\bumpeq
$\leq$	\lessgtr	$\geq$	\gtrless	≎	\Bumpeq
$\leq$	\lesseqgtr	$\geq$	\gtreqless	$\sim$	\thicksim
	\lesseqqgtr	\!!\\\!\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	\gtreqqless	$\approx$	$\$ thickapprox
$\stackrel{\cdot}{\preccurlyeq}$	\preccurlyeq	≽	\succcurlyeq	$ \cong $	\approxeq
$\Rightarrow$	\curlyeqprec	$\not\simeq$	\curlyeqsucc	$\sim$	\backsim
$\stackrel{\sim}{\sim}$	\precsim	$\succeq$	\succsim	$\geq$	\backsimeq
$\approx$	\precapprox	$\lesssim$	\succapprox	F	\vDash
$\subseteq$	\subseteqq	$\supseteq$	\supseteqq	I	\Vdash
$\subseteq$	\Subset	$\supset$	\Supset	III	\Vvdash
	\sqsubset		\sqsupset	€	\backepsilon
<i>:</i> .	\therefore	·.·	\because	$\propto$	\varpropto
1	\shortmid	П	\shortparallel	Ŏ	\between
$\smile$	\smallsmile	$\overline{}$	\smallfrown	ф	\pitchfork
$\triangleleft$	$\vartriangleleft$	$\triangleright$	$\vert riangle right$	<b>◄</b>	\blacktriangleleft

# AMS Arrows.

<b>←</b>	\dashleftarrow	<b></b> →	\dashrightarrow	<b>-</b>	\multimap
otin	\leftleftarrows	$\Rightarrow$	\rightrightarrows	$\uparrow \uparrow$	\upuparrows
$\leftrightarrows$	\leftrightarrows	ightleftarrows	\rightleftarrows	$\downarrow \downarrow$	\downdownarrows
$\Leftarrow$	\Lleftarrow	$\Rightarrow$	\Rrightarrow	1	\upharpoonleft
₩	\twoheadleftarrow	$\longrightarrow$	$\t$ twoheadrightarrow	1	\upharpoonright
$\longleftrightarrow$	\leftarrowtail	$\longrightarrow$	\rightarrowtail	1	\downharpoonleft
$\leftrightharpoons$	$\label{leftright} $$ \left( \begin{array}{c} 1 & 1 \\ 1 & 1 \end{array} \right) $$$	$\rightleftharpoons$	$\rightleftharpoons$		\downharpoonright
$\uparrow$	\Lsh	ightharpoons	\Rsh	<b>~→</b>	\rightsquigarrow
$\leftarrow$	\looparrowleft	$\rightarrow$	$\label{looparrowright}$	<b>↔</b>	\leftrightsquigarrow
$ \leftarrow $	\curvearrowleft	$\bigcirc$	\curvearrowright		
Q	\circlearrowleft	$\bigcirc$	\circlearrowright		

 $\unlhd$  \trianglelefteq  $\trianglerighteq$  \trianglerighteq  $\blacktriangleright$  \blacktriangleright

# AMS Negated Binary Relations and Arrows.

\$	\nless	$\nearrow$	\ngtr	≨	\varsubsetneqq
≨	\lneq	$\geq$	\gneq	$ \supseteq $	\varsupsetneqq
≰	\nleq	≱	\ngeq		\nsubseteqq
*	$\nleqslant$	*	\ngeqslant	≨	\nsupseteqq
$\leq$	\lneqq	$\geq$	\gneqq	ł	\nmid
$\stackrel{\leq}{=}$	\lvertneqq	$\geqq$	\gvertneqq	#	\nparallel
≰	\nleqq		\ngeqq	ł	\nshortmid
$\lesssim$	$\label{lnsim}$	<b>≱</b> ≳	\gnsim	Ħ	\nshortparallel
≨	\lnapprox	≵	\gnapprox	~	\nsim
$\star$	\nprec	7	\nsucc	$\ncong$	\ncong
$\npreceq$	\npreceq	$\not\succeq$	\nsucceq	$\not\vdash$	\nvdash
$\not \equiv$	\precneqq	≽	\succneqq	¥	\nvDash
$\stackrel{\scriptstyle \sim}{\sim}$	\precnsim	$\searrow$	\succnsim	$\mathbb{H}$	\nVdash
~ ₩	\precnapprox	∠æ	\succnapprox	$\not\Vdash$	\nVDash
Ç	\subsetneq	$\supseteq$	\supsetneq		$\ntriangleleft$
⊊	\varsubsetneq	$\supseteq$	\varsupsetneq	$\not\!$	$\ntriangleright$
$\not\sqsubseteq$	\nsubseteq	$\not\supseteq$	\nsupseteq	⊉	$\ntrianglelefteq$
$\subseteq$	\subsetneqq	$\supseteq$	\supsetneqq	⊭	\ntrianglerighteq
$\leftarrow$	\nleftarrow	$\rightarrow \rightarrow$	\nrightarrow	$\leftrightarrow\!$	\nleftrightarrow
#	\nLeftarrow	$\Rightarrow$	\nRightarrow	<b>⇔</b>	$\n$

# AMS Binary Operators.

$\dot{+}$	\dotplus	•	\centerdot	Т	\intercal
$\bowtie$	\ltimes	$\rtimes$	\rtimes	*	\divideontimes
U	\Cup or \doublecup	$\bigcap$	\Cap or \doublecap	\	\smallsetminus
$\underline{\vee}$	\veebar	$\overline{\wedge}$	\barwedge	$\bar{\wedge}$	\doublebarwedge
$\blacksquare$	\boxplus	$\Box$	\boxminus	$\ominus$	\circleddash
$\boxtimes$	\boxtimes	$\overline{}$	\boxdot	0	\circledcirc
$\searrow$	\leftthreetimes	$\angle$	\rightthreetimes	*	\circledast
Υ	\curlyvee	人	\curlywedge		

# AMS Miscellaneous.

$\hbar$	\hbar	$\hbar$	\hslash	$\Bbbk$	\Bbbk
	\square		\blacksquare	$\odot$	\circledS
Δ	$\vert$ vartriangle	<b>A</b>	\blacktriangle	C	\complement
$\nabla$	\triangledown	$\blacksquare$	\blacktriangledown	G	\Game
$\Diamond$	\lozenge	<b>♦</b>	\blacklozenge	*	\bigstar
_	\angle	4	\measuredangle	$\triangleleft$	\sphericalangle
/	\diagup		\diagdown	1	\backprime
∄	$\nexists$	Ь	\Finv	Ø	$\$ varnothing
$\eth$	\eth	$\Omega$	\mho		

# Math Alphabets.

Example	Command	Required package
ABCdef	\mathrm{ABCdef}	
ABCdef	\mathit{ABCdef}	
ABCdef	\mathnormal{ABCdef}	
$\mathcal{ABC}$	$\mathbb{ABC}$	
$\mathcal{ABC}$	$\mathbb{ABC}$	eucal with option: mathcal or
	\mathscr{ABC}	eucal with option: mathscr
ABCdef	\mathfrak{ABCdef}	eufrak
$\mathbb{ABC}$	\mathbb{ABC}	amsfonts $or amssymb$